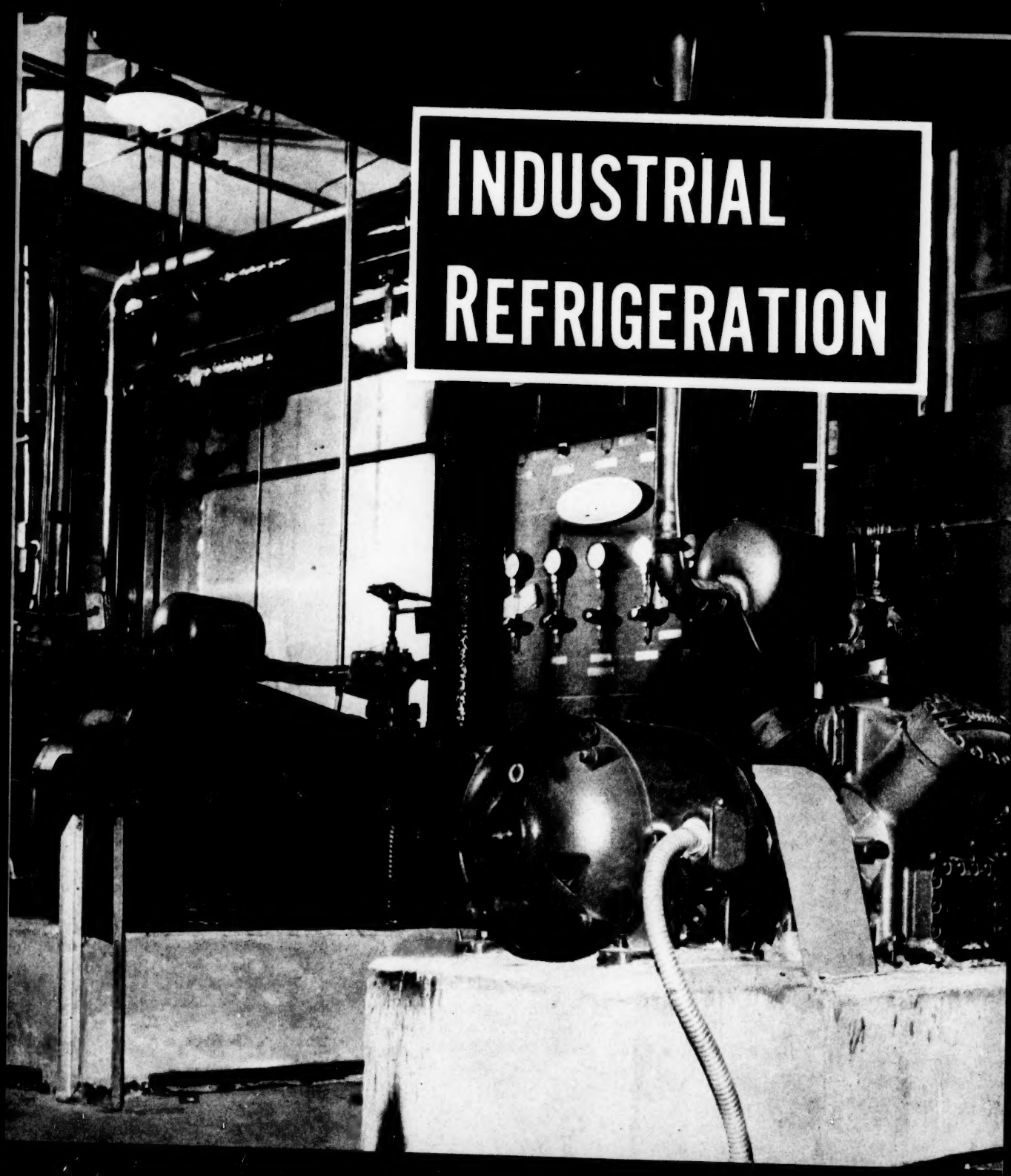
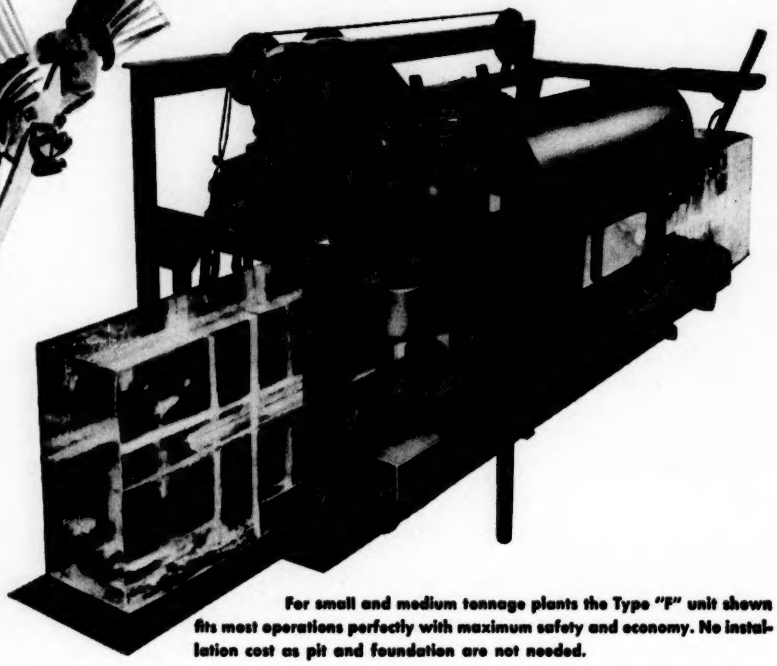

INDUSTRIAL
REFRIGERATION

Tops in ice scoring...



For small and medium tonnage plants the Type "F" unit shown fits most operations perfectly with maximum safety and economy. No installation cost as pit and foundation are not needed.

GIFFORD-WOOD TYPE "F" SCORING MACHINE

G-W ICE TOOLS

A complete line of top-quality hand-tools . . . tongs, hooks, shavers, bars, chisels, etc. . . . designed to make manual handling of ice easy and safe—made tough to stand the gaff of years. Write for Bulletin No. 480.

"Our Type 'F' Scorer has been in constant use for nearly 14 years and has...given the best service of any piece of equipment we have bought since we started in business in 1906."

We think this statement from one user speaks volumes for the quality of the Gifford-Wood Type "F" Scoring Machine. It is a rugged unit, precision-built to do a clean, even scoring job over many years—with a minimum of maintenance.

One-man operation of a G-W Type "F" Scorer delivers three or more 300- or 400-lb. cakes per minute—either in the storage room or on the platform. Completely portable, no hold-down bolts needed.

For full information on other types of ice scorers manufactured by Gifford-Wood, write for Bulletin 116A.

GIFFORD-WOOD CO.

NEW YORK 17 *Since 1814* CHICAGO 6

420 Lexington Avenue HUDSON, N. Y. 565 W. Washington St.

Pacific Coast Representative: Western Ice Equipment Company, 420 Market St., San Francisco 11

Cuber Breaker-Elevator Conveyor Breaker

0203

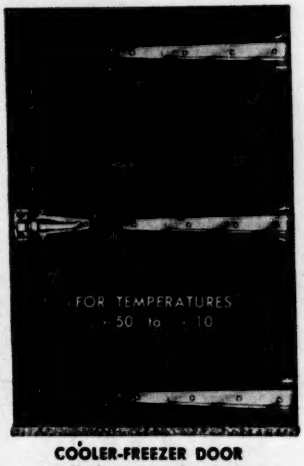
"Butcher Boy"

REFRIGERATOR DOOR CO.

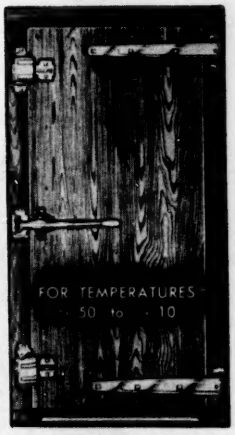
STRONGEST
MOST DURABLE
ONLY 100% MODERN

REFRIGERATOR DOORS
BUILT IN THE WORLD

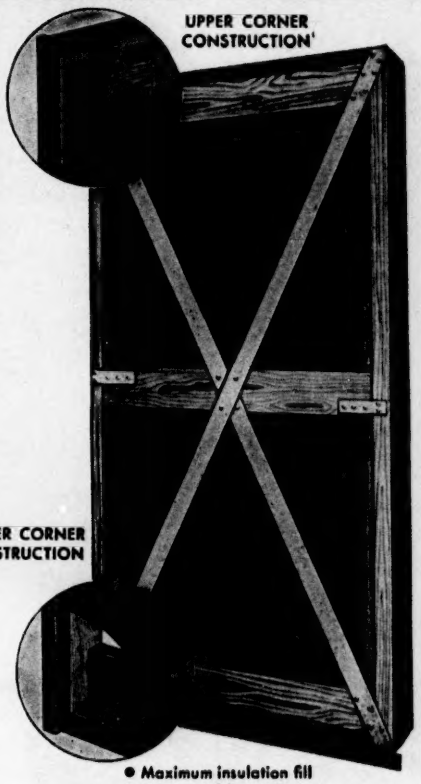
NEW "X-TYPE" DOORS
FEATURING "X-TYPE" STEEL DIAGONAL BRACING



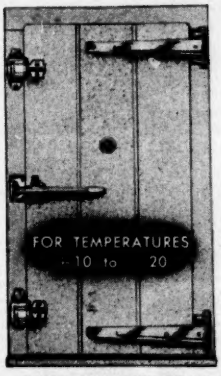
COOLER-FREEZER DOOR
- Modern streamlined job
- 100% "Douglas Fir"
- Sanitary hardware



X-52 PLYWOOD PANEL DOOR
- Plywood front and back
- Extra heavy-duty hardware
- Special type gaskets

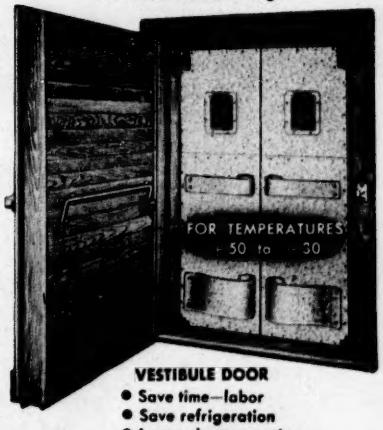


- Maximum insulation fill
- Most possible rigidity
- Allows reversal of swing



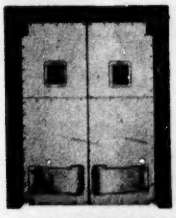
LOW TEMPERATURE DOOR
- Entire metal-clad front
- Extra heavy-duty hardware
- Special type gaskets

SUPER FREEZER (OVER-LAP) DOOR
- Extra-heavy construction
- Extra-heavy duty gaskets
- Extra heavy-duty hardware

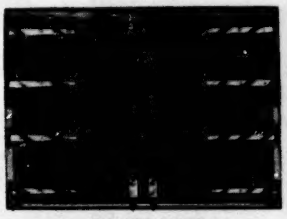


VESTIBULE DOOR
- Save time—labor
- Save refrigeration
- Large plant operation

TRACK DOOR
- For abattoirs
- Meat handling rails
- Banana rooms

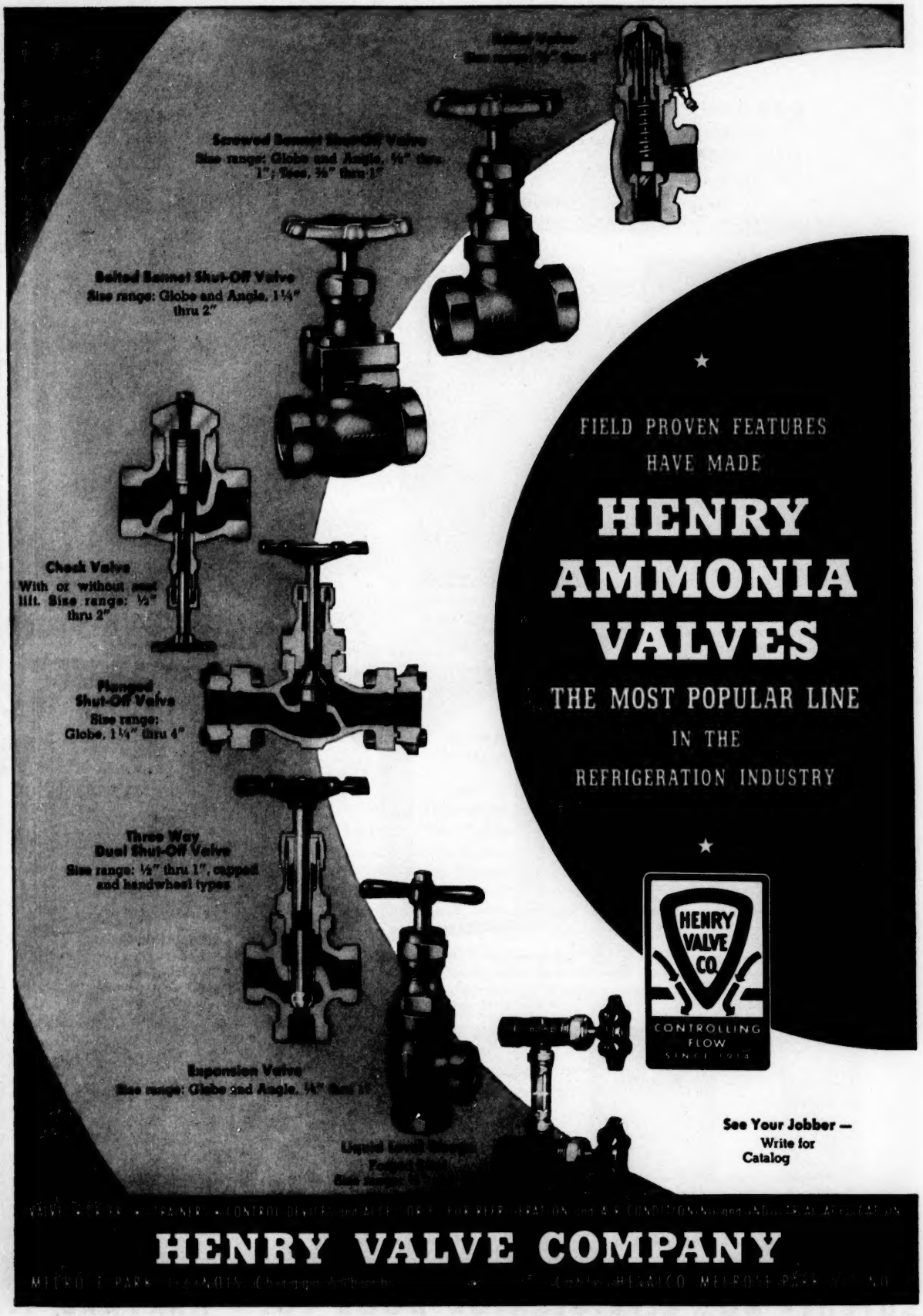


AUTO-CLOSE DOOR
- For loading dock
- Intra-cooler doors
- Heavy trucking



DOUBLE DOOR
- For palletizing
- For carloading
- For elevator shafts

BUTCHER BOY REFRIGERATOR DOOR CO. • HARVARD, ILL.


Screwed Bonnet Shut-Off Valve
Size range: Globe and Angle, ⅛" thru 1"; Seat, ⅜" thru 1"
Bolted Bonnet Shut-Off Valve
Size range: Globe and Angle, 1¼" thru 2"
Check Valve
With or without seat lift. Size range: ½" thru 2"
Flanged Shut-Off Valve
Size range: Globe, 1¼" thru 4"
Three Way Dual Shut-Off Valve
Size range: ½" thru 1", capped and handwheel types
Expansion Valve
Size range: Globe and Angle, ⅛"
FIELD PROVEN FEATURES
HAVE MADE
HENRY AMMONIA VALVES
THE MOST POPULAR LINE
IN THE
REFRIGERATION INDUSTRY
HENRY VALVE CO.
CONTROLLING FLOW
See Your Jobber — Write for Catalog
HENRY VALVE COMPANY

LETTERS

(Letters to the editor are welcome from readers of INDUSTRIAL REFRIGERATION on any subject of general interest.)

Industrial Refrigeration Represents Big Market

Wilmington, Del.

We have just reviewed the article on industrial uses of air conditioning and refrigeration in the August issue of INDUSTRIAL REFRIGERATION. You are to be congratulated on covering the subject in such a thorough manner, and we were glad that we were able to make some contribution to the article.

The whole field of industrial uses for air conditioning and refrigeration is an extremely important one and represents one of the very large potential markets for the sale of equipment. This article is not only of interest to readers of your publication but to many other men in industry as well; principally, those concerned with improving products, increasing production or lowering costs. It would seem that editors of other publications read by these other men in industry might profitably use information from this article to bring this important subject to the attention of their readers.

D. C. MCSORLEY
Advertising Manager
Kinetic Chemicals Division
E. I. du Pont de Nemours & Co.

Future Sales of Ice

Syracuse, N. Y.

Your article in the August number "He Put Ice Business on The Right Side of The Tracks," appealed to us. What we need to know is what form and where the future sales of ice are to be found. We think it is in properly prepared sized ice for the commercial trade, ice cubes, truck and car icing.

H. D. SANFORD,
People's Ice & Coal Company

Live Chickens on Ice

AFTER losing 404 broiler chickens to the extreme heat, flock owner S. A. Phillips, Welch, Okla., decided to keep the birds on ice. The loss dropped from 250 one day to only four the next after he placed six 300-pound blocks of ice in his brooder houses. The birds used the cool cakes for a roost.

Industrial Refrigeration

formerly **ICE AND REFRIGERATION**

Now in its 63rd Year of Publication

J. F. NICKERSON, FOUNDER

Vol. 127 October, 1954 Number 4

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The Cover:

View of new machinery room of new Arnold Bakeries bread freezing and storage plant, Port Chester, New York. Reciprocating compressor unit at right is used for the storage room system. The freezing system involves two-stage compression. The primary compressor, a rotary, is pictured at the left. See story on page 13.

Published Monthly by NICKERSON & COLLINS CO.

General Offices: 433 N. Waller Ave., Chicago 44, Ill. Telephones: AUstin 7-1303-04-05

H. T. McDERMOTT, EDITOR AND PUBLISHER — E. R. CURRY, MANAGING EDITOR — J. R. KELAHAN, TECHNICAL EDITOR — H. D. BUSBY, ASSOCIATE EDITOR

ADVERTISING—O. RHODIUS ELOFSON, DIRECTOR — EDW. DAVIESON, Advertising Representative

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INDUSTRIAL REFRIGERATION, Vol. 127, No. 4 Published monthly at 433 N. Waller Ave., Chicago, Ill., U.S.A., by Nickerson & Collins Co. Yearly subscription in the U. S., $2.00 per year; other countries, $3.00. Single copies, 25 cents.

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Industrial Refrigeration is indexed regularly by Engineering Index, Inc., and is microfilmed for library use by University Microfilms.

What's New

MACHINERY
APPLIANCES • PROCESSES

Pipe Covering For Low Temperature Liquids

VAPO-WALL low-temperature pipe covering as an effective insulation for extremely low temperature liquids, has been developed by M M M Incorporated, Houston, Texas. In demonstrating its use in the various food processing and chemical industries, a small demonstration container is being used, made of two sections of this pipe covering, plugged at either end with discs of Styrofoam, from which Vapo-Wall is fabricated.

Held together by steel bands; with or without adhesive in the joint, and covered with rubber-based white and green paint solely for eye appeal, these Styrofoam containers are filled with dry ice. Although these sections of Vapo-Wall pipe covering are just two inches thick and the temperature of the dry ice is −110 degrees, the containers according to the manufacturer, remains warm to the touch and do not sweat! The temperature variance in the insulation itself ranges from −110 F on the inside, or two-inch thickness to 20 F in the middle, one inch from either side to room temperature at the outside of the container.

New Produce Display Case And Ice Maker

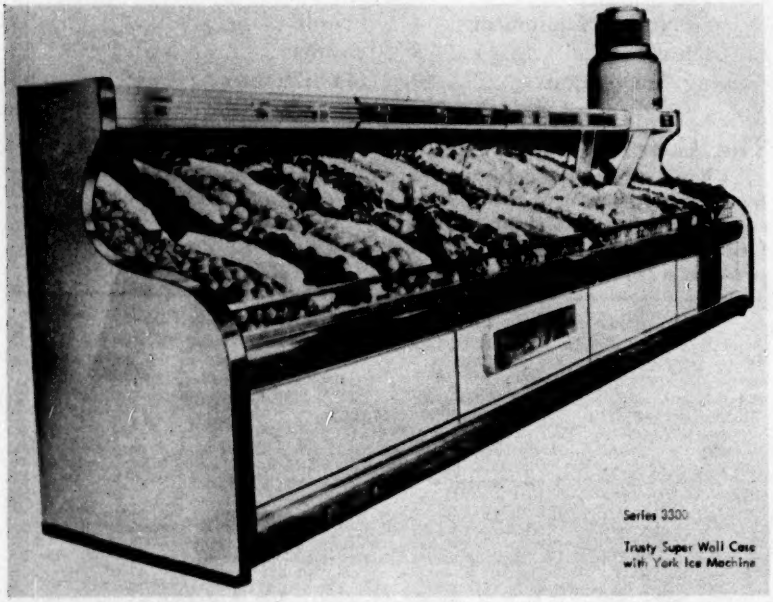
THE FIRST complete "Live Produce Merchandiser," which incorporates a produce display case and an automatic ice maker is now being offered by Trusty Manufacturer's, Inc., of La Porte, Indiana.

Utilizing the latest technique in produce merchandising, channel-icing, the unit features the Trusty Deluxe Display Case with a Model DER-2B York-FlakIce Automatic Ice Maker mounted on top of the case. A visual ice chute carries the ice to an insulated ice storage bin under the display area.

The "Live Produce Merchandiser" eliminates the problems of spoilage, shrinkage and moisture loss. Makes it easy for the busiest clerk to maintain beautiful, glistening produce displays. The ice is manufactured on the spot and stored in the same case which displays the vegetables.

One large eastern supermarket chain reported reducing its produce loss 50 per cent through the use of channel-icing. This same firm developed the channel-icing technique. Metal channels filled with ice are placed 18 to 24 inches apart. A raised bottom in the case provides a six-inch opening under the display. Cold air circulates across the ice channels, which are kept higher than the display and under the produce.

The York DER-2B Automatic Ice Maker is a small, completely self-contained ice making machine which can produce over 300 pounds of ice a day. It is designed for economical use in establishments requiring as little as 200 pounds a day. The Trusty display case is made in five-foot sections to accommodate any size application. It is all-steel and rust-resistant with a convenient drop-front door on the ice storage bin.

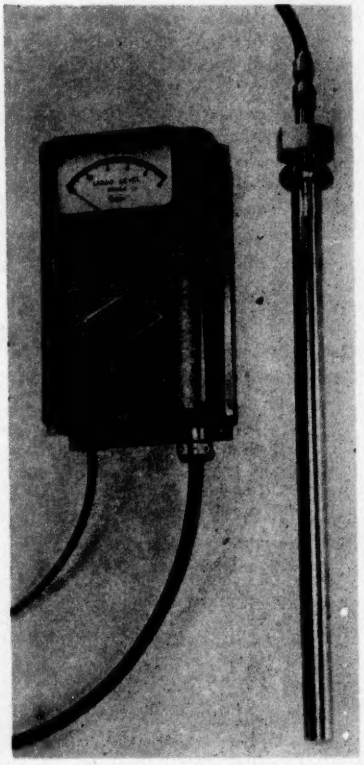


New Trusty Super Wall produce display case with York Automatic ice maker.

Capacitive Level Indicator

CAPABLE of providing a continuous indication of level for a wide range of materials in storage or process, the new Belmont Level Indicator utilizes a capacitive-type sensing-element probe with no floating or moving parts nor contact-making electrodes.

Suitable for use with most non-adhesive chemicals, milk, oils, refrigerants such as ammonia and the Freons, and all condensed gases, the instrument is operable over a temperature range of 500 to minus 425 F, and from high vacuum to 100,000 psi.



Belmont Level Indicator

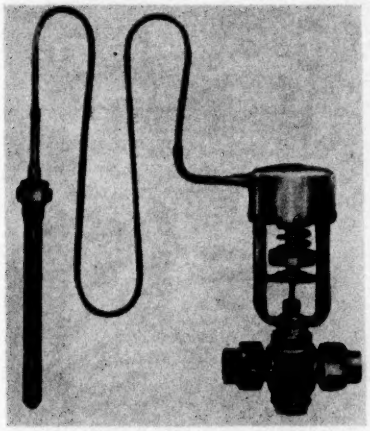
Various probe lengths, materials, and designs are available to cover different ranges in the rise and fall of materials, the character of substances encountered, and special problems such as the sanitary needs of the food and dairy installations, or the non-entraining requirements of relatively viscous materials.

New Rubalt Paint Provides Protection

RUBALT "RA" black paint, made by Alfred Hague & Company, Brooklyn, N. Y. has found wide use as a fast-drying corrosion-protection finish. This is a rubber base paint made of a combination of rubber and bitumen. It can be applied to any surface. The adhesive qualities are such that galvanized iron, aluminum, and zinc can be successfully painted without use of a primer or surface treatment. It is easily applied with brush or spray gun.

Temperature Regulator

THE STURDY industrial temperature regulator, familiar to engineers and maintenance men, may seem like a staid item without complications. But a statistician at Fulton Sylphon Division of Robertshaw-Fulton Controls Company, a leading controls manufacturer, has calculated that there at least 24,640 possible standard combinations of the company's No. 999 regulator to meet a wide variety of conditions. This includes combinations of available valve sizes, valve types, temperature ranges, bulb types and materials. It does not include all possible variations of tube length nor some of the special features available, such as an indicating thermometer.



New 999 Temperature Regulator, Robertshaw—Fulton Controls Company

The 999 regulator is used to control temperature of internal combustion engines, storage water heaters, bottle washers, and a variety of other equipment and for industrial processes requiring accurate temperature control, particularly in the chemical, pharmaceutical, food processing, leather and textile fields.

The 999 regulator is self-powered, and requires no compressed air, electricity or other outside source of energy. It is simple and sturdy in design and construction. The frame is stainless steel. A large, two-ply, seamless metal, sylphon bellows provides long life. Over-temperature protection is a standard feature.

Penny Refunder For Vending Machines

WITH the increased use of pennies in vending, operators have been faced with new problems demanding better penny handling methods. As one solution, National Rejectors, Inc., manufacturers of coin handling equipment exclusively, have developed the Penny Refunder which enables the vending machine to give change in pennies. Now, in combination with the Penny Refunder, National offers a "give and take" feature which will enable units to both *give* and *take* pennies.

This is the first time a complete and efficient penny handling method has been made available. With this feature, a customer can make an odd cent purchase and receive change in pennies, then reuse the pennies to make additional purchases.

National's Penny Refunder has a simple plug-in installation with front, side or inside mounting. The mechanism is designed to prevent jack-potting and has fast hopper loading with a large 2000 penny capacity. Price changes may be made right on location in just a short time.

Truck Air Conditioner Holds Cold Drinks

TRUCK drivers are being treated to a new combination heating-cooling unit that not only helps their cabs at an even temperature but offers them a compartment to store hot or cold drinks. Made by A.R.A. manufacturing Company of Fort Worth, the unit is claimed to be the first combined refrigerated air conditioner and heater for truck cabs in production.

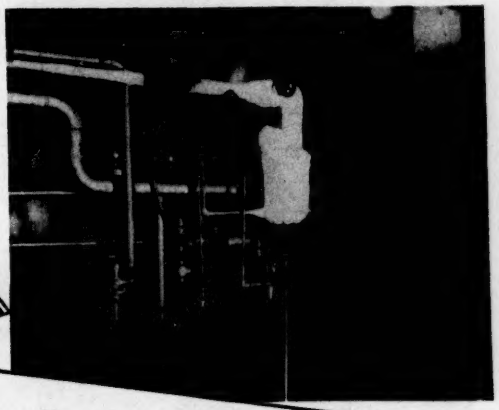
The air conditioning unit measures 22½ x 10 inches and stands 14 inches high. It fits under the instrument panel without cutting into the cab's passenger room. Like the company's refrigerated air conditioners for passenger cars, the truck model, which has a cooling capacity of two tons, is powered off the crankshaft. The compartment for drinks is an optional feature and holds a dozen 12-ounce cans or six 12-ounce bottles.

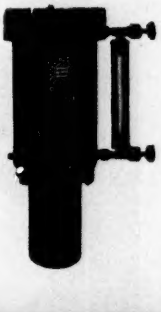
PURGING BY HAND?

WHY NOT CHURN YOUR OWN BUTTER?

Today's methods of making butter have put the old fashioned butter churner out in the barn forever. Purging refrigerant by hand is just as outmoded because an Armstrong automatic forged steel purger will do a more thorough job without wasting a lot of costly refrigerant. When head pressures go up, the engineer merely turns the purger on, then turns to more important and profitable work. In the meantime the purger gets rid of all non-condensable gases in the system.

The result is: You save time and refrigerant and get much greater refrigeration capacity. You lower your power costs and cut cooling water consumption.





The Proof is in user reports:

★ **$225 AMMONIA SAVING THE FIRST YEAR—** Velvet Freeze Inc., Kansas City, Mo.

★ **POWER COSTS CUT 20%—** Rubenstein & Son Produce, Inc., Dallas, Texas

★ **COOLING WATER CONSUMPTION CUT IN HALF—** Producers' Dairy Co., Brockton, Mass.

★ **HEAD PRESSURE 50 LBS. LOWER—** Mayo Hotel, Tulsa, Okla.

★ **ALLOWS TIME FOR DUTIES ELSEWHERE—** engineer at Alta Vista Creamery, Fort Worth, Texas

★ **PURGER PAID FOR ITSELF IN 30 DAYS—** Dalton Ice Co., Dalton, Ga.

Send for Bulletin No. 221. Learn how to cut your refrigeration costs and get more capacity from your refrigeration system.

ARMSTRONG MACHINE WORKS
860 Maple Street • Three Rivers, Michigan

ARMSTRONG PURGERS

Guaranteed to satisfy

From Any Angle!

Easy-reading Taylor Industrial Thermometers invite frequent readings for better protection of your equipment.

For Cold Water and Brine Lines, Insulated Brine or Ammonia Lines, Condenser and Water Lines, Hot Water and Steam Lines, Ammonia Discharge Lines, Brine Tanks and Cold Storage Rooms. Wide selection of bulb and stem styles and angles. Ranges from −40° to +950°F. or equivalent Centigrade. Rattle and dust-proof cases. Three-times easier-to-read BINOC* tubing.

For insulated brine or ammonia lines
Insulated stem, straight (shown) or 90° angle. Range minus 40° to +110°F.

For cold storage rooms
Straight or 90° angle (shown). Supersensitive bulb for air and gas temperature measurement. Range minus 40° to +110°F.

For brine tanks
Oblique angle (150°) designed for easy reading below eye level. Range minus 40° to +110°F.

For small diameter brine or ammonia lines
½" fixed thread connection. Stem extends 1" below the thread. Range minus 20° to +120°F.

There's a Taylor Thermometer for practically every temperature measuring problem. Ask your Taylor Field Engineer, or write for **Catalog 300.** Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.

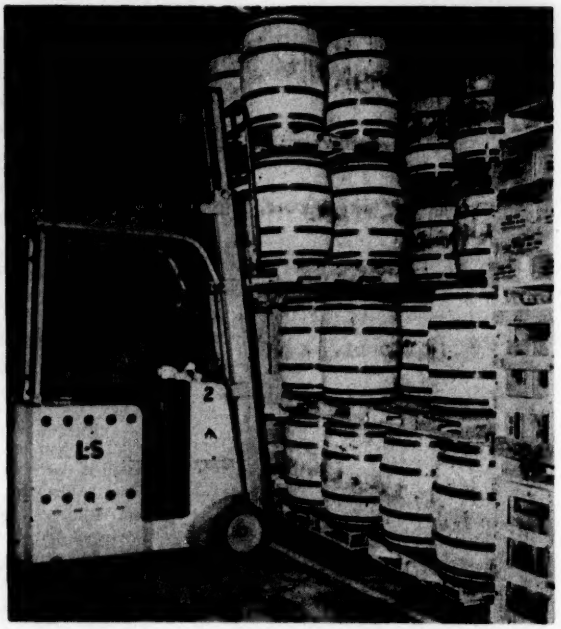
Instruments for indicating, recording and controlling temperature, pressure, flow, liquid level, speed, density, load and humidity.

*Reg. U. S. Pat. Off.

TAYLOR INSTRUMENTS MEAN ACCURACY FIRST

Electric Trucks For Freezers

A LINE of electric trucks specifically designed for work in cold storage freezers has been developed by Lewis Shepard Products Inc. Watertown, Mass. This line includes riging type fork trucks (pictured), riding type straddle trucks and "walkie" trucks.



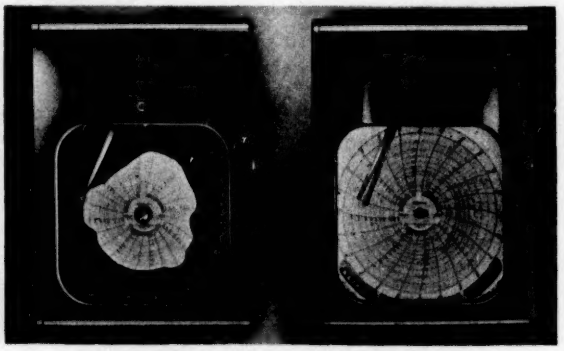
Electric fork truck in operation, specially designed for work in cold storage freezers.

Among the special features incorporated in this line of trucks for corrosion-resistant construction are undercoating, special hydraulic oils, and plating of exposed moving parts to prevent rusting. Other optional features on the riding type trucks include stainless steel steering chain, canvas padding in operator's compartment, spot lights on carriage and mast, and locking type lift and lower controls.

All trucks have roller type masts, with both carriage and inner mast riding on ball bearing rollers, packed with a rust-preventive grease. No periodic lubrication is required with sealed bearings used throughout the line. The short turning radii of this line of trucks reduce to a minimum valuable aisle space requirements.

Control Instrument For Test Cabinet

A COMPLETE line of control instruments for use with environmental test cabinets has been announced by The Bristol Company of Waterbury, Conn. These instruments can be used



Two-Case Model Bristol Control

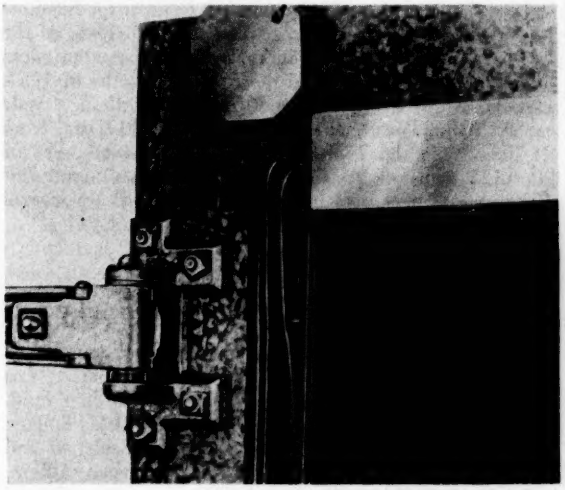
to initiate and maintain an entire program of varying climatic conditions within the test cabinet, and to simulate any desired temperature, humidity, or altitude conditions.

The program controllers, available in one or two case models depending on application, will carry through the program repeatedly and reproduceably. They can also be used to bring temperature, pressure, or vacuum up to any desired value and maintain it there for a predetermined length of time. Accuracy of control is ½ percent of full scale value. Available with electric on-off or proportional-input control, or with pneumatic control in proportional, reset, or derivative modes, the instruments can be adapted to any model test cabinet. The two-case models can be mounted one above the other or side by side to suit the requirements of the cabinet.

A plastic or aluminum cam serves as a template for the program. The cam can be changed in a matter of seconds for another cut to a different program. This allows a complete change in the program maintained by the cabinet. No skilled labor is required to make the change.

Heater Cables Prevent Freezing Of Low Temperature Doors

HEATER cables to prevent the formation of ice on the frames of low temperature doors have been developed by the Jamison Cold Storage Door Company of Hagerstown, Md. The cables are thermostatically controlled and embedded in the frame where the gaskets of the door make contact. They are laid in asbestos lined channels cut in the casing. When desired, they also may be embedded in the sill.



Section of cover plate removed to show position and appearance of heater coils underneath. (Jamison Cold Storage Door Co., Hagerstown, Md.)

In operation, the heater cables keep the gasket contact areas of the frame above the dew point temperature. This prevents moisture condensation and thus eliminates the formation of frost or ice at excessively low temperatures, even below −50 F. While prolonging the life of the gasket, the cables are said also to reduce other maintenance costs on the doors and frames.

The whole contact area of the gasket is exposed to the heat of the cables. These are completely encased in a lead sheath and, along with a thermoswitch, are set in flush with the surface of the frame. They are concealed from view by a stainless steel cover plate against which the door gasket makes contact. The thermoswitch is adjustable and accessible for changing the temperature setting if desired. A simple turn of a screw driver controls the setting.

Door frames with heater cables installed are available as optional features on all Jamison freezer doors, low-temp doors and super freezer doors. They are also available for horizontal sliding doors, vertical sliding doors, batten doors, package passing doors, etc. Cables are also supplied in frames for all types of door sills . . . high sills, beveled wood sills and concrete sills.

THERMOBANK
FOR
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THERMOBANK
the defrosting system that makes Ammonia SHINE!

LUCERNE MILK COMPANY, of Los Angeles, Calif., modernized with KRAMER AMMONIA THERMOBANK automatic defrosting system to end years of expensive manual defrosting.

"BEFORE" photo shows iced condition of the old overhead coils.

"AFTER" photo, same room, modernized with KRAMER Ammonia THERMOBANK at minus 25° F; 6400 gallons hardened daily.

INSTALLED BY ASSOCIATED REFRIGERATING ENGINEERS, LOS ANGELES, CALIFORNIA.

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400 TONS CAPACITY

PATENTED DUO-PASS and OILOUT

Aeropass CONDENSER

U. S. Patent Reissue No. 21,917; 22,553

YOU USE LESS POWER...

SAVE CONDENSER WATER...

SAVE UPKEEP COST

For large refrigeration systems, NIAGARA gives you a choice between a battery of condensers (that may be cut on or off with the load) or a high capacity condenser that saves space.

Both have the patented "Duo-Pass" and "Oilout" that remove superheat and keep the system free of oil. Results: you save one-third or more of power cost and upkeep expense. Niagara Patented Balanced Wet Bulb Control gives lowest head pressure operation automatically. *Write for Bulletin 111.*

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Over 35 Years Service in Industrial Air Engineering

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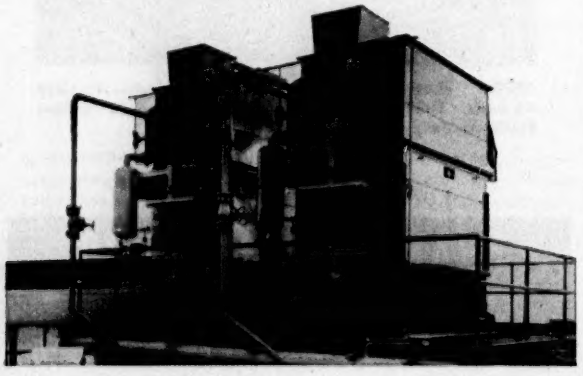


PRESS BRIEFS

Diversification Promises Better Sales Results For American Service

ALTHOUGH sales and earnings of American Service Company, New York (over the counter) in the second quarter and first half this year were below comparable 1953 levels, this operator of 44 ice and cold storage plants believes its stepped-up diversification program may show better results in the near future.

The company earned $28,940, equal to 83 cents a share, on sales of $1,429,564 in the second quarter against $132,394, or $3.50, on sales of $1,536,077 in the like 1953 period. Operating losses in the first quarter this year resulted in a net loss of $129,977 for the first six months on sales of $2,476,240, against a loss of $16,181 in the 1953 first half on sales of $2,568,062.

American Service is entering the automatic vending "drive-in" business with three new units slated to go into operation this month. New business has been developed this year through hydro-cooling of peaches, meat-on-ice installations, marketing of packaged ice in supermarkets and installation of refrigerated sub-stations in suburban communities.

In 1953 less than 40 percent of Company's business was in ice sales. This year, more than 70 percent of the sales are in frozen foods, general merchandise, appliances and lines other than ice. In the first six months of 1954, ice sales were $703,423, or $155,950 less than a year earlier. Other product sales were $1,772,817, up from $1,708,689 in the 1953 first half. Frozen food sales of $860,125 were off $30,349 from the first six months of 1953, due to a change in marketing methods by several of American's large customers.

New California Freezer Plant Completed

COMPLETION of a freezer plant has been announced by the Terminal Refrigerating Company, Los Angeles, Calif. The cost of the project, including land, building and equipment, is estimated at one million dollars.

The new plant at 2233 Jesse street was designed and constructed by the William J. Moran Company, Alhambra, consulting engineers and general contractors. It will serve food distributors, chain stores, and the frozen food industry throughout Southern California, Nevada, and Arizona. The site is near the junction of Freeways and is also served by the Union Pacific Railroad.

J. W. Bernard, general manager of the Moran Company, said that a new method of joining the exterior walls with an internal roof-supporting steel frame was developed which will minimize heat transference at points of connection.

The new 800,000 cubic feet building is of precast reinforced concrete construction with a roof system of wood joists and diaphragm supporting the ceiling insulation and covered with three layers of Fiberglas felt roofing, flood-coated between each layer with asphalt to provide a vapor seal. A layer of crushed rock completes the roofing construction.

Completion of the new plant, the first unit of three ultimately to be constructed at the location, was formally observed with open-house ceremonies, attended by many representatives of the perishable-food industry as well as Southland business leaders.

Continental Freezers Increases Blast Freezing Capacity

CONTINENTAL Freezers of Illinois, Inc., announced in September the opening of three new blast freezer facilities of sufficient capacity to freeze 80,000 pounds each of food stuffs every 24 hours, at minus 35 to 45 F. A. Epstein & Sons are the architects and engineers.

Officers of the firm stated that the added facilities will make available to Continental customers a greatly increased freezing service. By means of a unique arrangement of adjustable enclosures on three sides, although the new blast freezers can be expanded to accommodate as much as 240,000 pounds of merchandise, lesser quantities may be handled by the new blast freezing units, and original freezer room blower units are adjustable to cover the additional area as freezer storage.

In accordance with principles made positive when the plant originally opened early in 1952, the most modern up-to-date equipment available has been purchased from Burge Ice Machine Company, Chicago. The installation for the new blast freezers consists of a 100 hp FES rotary ammonia booster, a 100 hp Vilter VMC ammonia compressor, 3 Niagara Blower Company tandem air units utilizing "no frost" solution, and a Niagara evaporative condenser.

Training Conference

A NATIONAL training conference for warehouse personnel will be held at the Edgewater Beach hotel, Chicago, January 10-13, 1955 by the Refrigeration Research Foundation and National Association of Refrigerated Warehouses. The program will cover all phases of refrigerated warehouse operations, designed especially for executives, managers, foremen, superintendents and engineers. Suggestions are invited.

On January, 13-15, overlapping the training conference, the annual meeting of the Scientific Advisory Council of the Foundation will take place in the same hotel. To these sessions are invited also the United States Department of Agriculture Cold Storage Research Advisory Committee, so that its members can join in the consideration of research on the refrigeration of commodities, in advance of the formal meeting of the Committee in Washington February 14-16, 1955.

The Council sessions are planned to end at noon on Saturday, January 15, to be followed by a preparatory research planning meeting of the Advisory Committee, after its members have participated in the council sessions. Members of the newly formed Industry Advisory Council of the Foundation are urged to attend these council sessions and participate in them.

Armour Leases Refrigerator Cars

TO INSURE delivery of perishable meat products in top condition, Armour and Co. has completed arrangements for the long-term lease of 600 new refrigerator cars built by Pacific Car and Foundry Co.

The cars were built at Pacific Car's Renton plant for the American Refrigerator Transit Co. according to Armour specifications.

They are similar in design to the 2,000 all-steel cars the company has put into service in the last few years but have an improved brining system, according to H. O. Mathews, manager of Armour's transportation and distributing department.

Each car has a capacity of 7,500 pounds of ice and 500 gallons of brine. These cars will go through fourth morning delivery without re-icing. This compares with standard type cars which need re-icing every 24 hours.

Mr. A. Gordon Janney (left), President of The Baltimore Cold Storage Company, discussing installation of corkboard insulation with Mr. W. S. Woodside, Baltimore District Manager of United Cork Companies

FROZEN FOODS STORAGE PLANT EXPANDS USE OF CORKBOARD

First installation of United Cork Companies' BB (Block-Baked) Corkboard at the plant of The Baltimore Cold Storage Company was made because Mr. A. Gordon Janney, President of the company, regarded corkboard as both the most economical and the most efficient type of low-temperature insulation.

This installation, made in 1947 in a room used for storage of frozen foods at a temperature of 5° below zero F., was designed by United's Engineering Service, in cooperation with Mr. Van Rensselaer H. Greene, Consulting Engineer for the Baltimore Cold Storage Company.

Two layers of 3" BB Corkboard were used. The first was erected against brick in a bedding of Enamelite, and the second against the first—also in Enamelite.

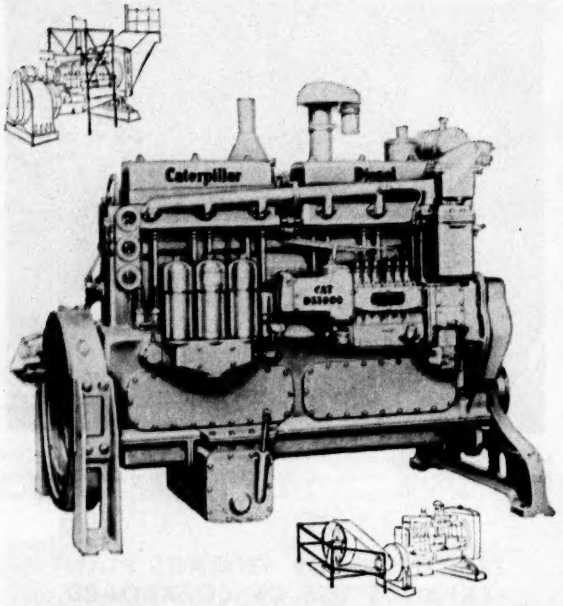
The entire installation was made by United Cork Companies' own skilled erectors, working under the supervision of the Baltimore Division. An interesting feature of the installation is that all work was done while a temperature of 5° below zero F. was being maintained in the room.

Results Lead to Re-orders

The Baltimore Cold Storage Co.'s experience with BB Corkboard was so successful that the company has since made new installations to convert three floors from cooler to freezer use.

A major factor in the effectiveness of United's BB Corkboard, in the opinion of Mr. Janney and thousands of other satisfied users, is the unified responsibility for the entire job. United Cork Companies select the grade of cork and bake the granules into BB Corkboard by a patented process. Engineers at United's branch offices throughout the country design the installation, and erection work is done by United's own skilled erectors under the supervision of the local Division Manager.

For more information about United Cork Companies' services and installations, drop a line to United Cork Companies, Dept. I-6, Kearny, N. J.



Announcing the

NEW 190-HP CAT* D13000 ENGINE

CATERPILLAR ADVANCED DESIGN FEATURES IN THE NEW D13000

While retaining such time-proved features as aluminum alloy main and connecting rod bearings, "Hi-Electro" hardened and Superfinished bearing surfaces, exclusive Caterpillar fuel injection system, ability to use low-cost No. 2 furnace oil without fouling, etc., the new D13000 incorporates many new features, among them:

NEW Valves, Inserts, Rotators—new components, standard in the breathing system, combine increased breathing ability with longer valve life—make possible additional horsepower output and lower maintenance costs.

NEW Vibration Damper—sturdy, metal-enclosed, fastened directly to front of crankshaft. Keeps unit vibration-free at higher speeds. Optional in installations where engine speed is kept below 1000 r.p.m.

NEW Camshaft—improved high lift cam profiles give smooth valve seating and increased breathing ability. This increased capacity, also made possible by new oil-bath air cleaner and larger intake and exhaust manifolds, insures low exhaust temperatures and adequate reserve power.

NEW Water Pump—larger, with a greatly increased capacity to answer cooling needs of this modern, high-powered diesel.

NEW Pistons—oil-cooled, made of high-strength, lightweight aluminum alloy with stainless-steel heat plugs in the high-temperature zone and cast-in iron bands for the top ring groove to give best service at lowest final cost.

NEW Oil Pump—features not just one, but two pressure controls to assure correct lubrication for all moving parts from the first turn of the crankshaft.

For complete details, specifications, attachments, etc., see your nearby Caterpillar Dealer

...and the new 100-KW D13000 Electric Set!

For years, the profitable performance of both the Caterpillar D13000 Engine and D13000 Electric Set has been a byword with power users. Now, here's a new D13000, designed and built to bring you even greater power, production and profits.

In the new D13000 Engine, you get 21% more brake horsepower. Its governed speed, raised to 1200 r.p.m., provides greater versatility and productive capacity. While keeping its outstanding time-tested parts, it adds advanced design features to set new high standards of stamina, dependability, economy and long life. And its wide variety of matched accessories and attachments makes it readily adaptable for any need.

Have you an operation requiring power in the 145 (continuous) to 190 (intermittent) horsepower range? Your best buy is the new Cat D13000 Engine! Does your setup call for a unit furnishing 100 KW? The new D13000 Electric Set is the best answer to that need! Both units are easy to install. Get the *complete* facts about the rugged new D13000 from your nearby Caterpillar Dealer!

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

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D13000—A NEW STANDARD OF DIESEL EFFICIENCY

In the Spotlight

DESIGNED specifically for freezing bread products, a new freezing and storage plant has been put in production at Port Chester, N.Y. by Arnold Bakers, Inc. With this new facility the company expects to attain more efficient distribution in its distant markets and expansion of sales to sections where premium bread products are not now available. For story and pictures of this new plant see page 13.

A HEAT PUMP application installed in the Equitable Building in Portland, Oregon has been in operation a year, during which time its operation has been constantly observed. Its performance has been completely satisfactory, a fact which would have been considered impossible a few years ago. The article on this installation, page 15, gives specific attention to details of energy costs for heating and cooling, also costs of maintenance and operation.

THE EGG MARKETING Board of New South Wales, Australia now has in operation a huge egg-packing plant, equipped for modern processing and storage of eggs and egg products. Temperature control is recognized in this plant as a vital factor in the preservation of the product. For complete description of layout and refrigerating equipment see page 24.

SANITARY ICE is a subject of much importance to the ice industry because it has a big influence upon public relations. In absence of official sanitary regulations in North Carolina the ice association in that state drew up voluntary regulations for use of its members. These are published in the article on page 26.

PROPER STORAGE of frozen foods include such fundamentals as low and even temperatures, high relative humidity, uniform air circulation, rapid handling outside of storage rooms. These and other essentials are discussed by an experienced storage man in the article starting on page 21.

RAILROADS are trying to win a bigger part of the fast-growing frozen food industry trade by putting into service mechanically refrigerated cars. From this profitable traffic last year, they obtained six percent of the revenue collected for hauling perishable foods. The situation is fully described in the article on page 32.

A FOOD FREEZING plant is being built at Miami that will be strictly modern with a number of innovations in construction. It is expected to be stimulus to agricultural interests of southeast Florida who may use facilities for utilization of products after harvesting season. Exterior decoration will be in line with modern ideas. For description of this new plant see page 28.

CANADIAN TRUCKERS are regarding the 63,400 freight carloads of fresh fruits and vegetables unloaded at principal Canadian markets as potential business, according to G. M. Parke, president of the Canadian Trucking Association. See page 29.

THE ANNUAL Ice Convention will be held again this year (November 9-12) at the Netherlands Plaza Hotel, Cincinnati, Ohio. An informative program and high-class entertainment is promised. For announcement see page 30.

FOR SELLING overcoats in July, a men's clothing store in Portland, Oregon, devised the novel scheme of piling snow ice on the sidewalk in front of the store. More than twenty tons of ice was used. It worked perfectly, and the same came fully up to expectations of the owner. For story and picture, see page 30.

COMPLETE air-conditioning of a large first-rate hotel is a difficult financial headache, not from equipment cost point of view, but from loss of room revenues. Kirkeby Hotels management and the contractor for their Philadelphia Warwick tackled the problem in a step-by-step method, employing new equipment ideas for maintaining room occupancy. One centrifugal and two absorption refrigeration water chilling plants, and central systems were employed. See complete description in article on page 33.

THE ROOSEVELT Hotel at New Orleans, headquarters for the NAPRE Convention November 2-4 will be an interesting place for the engineers from the standpoint of its air conditioning and other refrigerating features. Not the least of these features is the chief engineer, John J. Bryner, who will be on hand to welcome the members as unofficial host. For sketch of the hotel and Mr. Bryner, see page 42.

CONVERTED for mechanical refrigeration, a new type mechanically refrigerated car has been developed with a diesel driven condensing unit and hold-over plates. Details with illustrations are given in the article on page 45.

MEAT PRODUCTION will set a new record this year, according to the American Meat Institute. Present trends indicate a total of 25¼ billion pounds of meat, a record high, and three percent above last year's production.

In planning or estimating cold storage insulation...

For NEW MODERN PRODUCE COOLERS

Palco Insulation Board laid to required thickness provides ample strength to support finish slab of reinforced concrete and handle all anticipated storage loads.

Palco Wool is completely self-supporting, non-settling—can be put in place and inspected to assure void-free application before interior lining is put in place.

Specify

SELF-SUPPORTING, NON-SETTLING . . .

PALCO INSULATION WOOL®

PALCO INSULATION BOARD®

Market Distributing Company's new Dallas plant is one of the most modern installations now in operation. Among its features are three produce coolers with a holding capacity of eight box cars. Each is normally held at 25° to 45°, but can maintain constant temperatures as low as 0° due to the high insulating efficiency of Palco Wool loose fill insulation in walls and ceilings, and Palco Board Insulation supporting the concrete floor slab. The produce coolers are lined with Palco Redwood, and are used for year-round storage of Summer and Winter fruits and vegetables. For the most effective combination of insulating materials for the best engineered cold storage application, get full details on Palco Wool and Palco Board Insulation.

Write today for your free copy of Cold Storage Manual, and free sample of Palco Wool and Palco Board Insulation.

THE PACIFIC LUMBER COMPANY

100 BUSH STREET, SAN FRANCISCO, CALIFORNIA
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PALCO WOOL INSULATION
has high efficiency of .26 B.t.u., ideal for all loose fill applications.

PALCO BOARD INSULATION
offers low thermal conductivity of .30, with high structural and compressive strength. 1", 2" or 3" thickness, 12"x36", 18"x36", 24"x48" and special sizes to 48"x72".

New Bread FREEZING Plant Opens For Full Scale Operation

The freezing of dough for bread and other bakery products is becoming an acceptable practice, as shown by the experience of this bakery in Port Chester, N. Y.

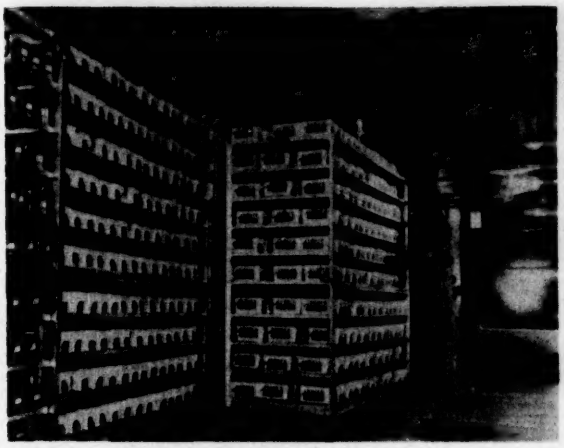

Fig. 1 — Racks of bread being quick-frozen in the freezing room at Arnold Bakers, Inc., Port Chester, N.Y.

EARLY summer brought full scale operation of the new bread freezing and storage plant of Arnold Bakers, Inc., Port Chester, New York. With its new plant, the first refrigeration plant designed specifically for bread products, Arnold looks forward to more efficient distribution in its distant markets, with eventual expansion of sales to those parts of the country where premium bread products are not now generally available to consumers.

Since it pioneered in the sale of quick-frozen bread on a commercial scale more than a year ago (see INDUSTRIAL REFRIGERATION, February, 1954), Arnold has been using public facilities in another city for storage of its frozen products. "Now that we have our own refrigeration plant," Paul Dean Arnold, President, said, "we will be able to freeze bread at the peak of its freshness, only minutes away from the oven. Also, since we can stockpile our full line in the refrigerated storage space right at the bakery, we will be able to give faster service to our distributors, especially on those items where the demand fluctuates widely."

Freezing—Packaging Procedures Followed

After normal cooling and wrapping, the individual bread loaves are placed on racks, which are then wheeled into the freezing room (see Fig. 1). There, the bread is quickly frozen at minus 20 F. The racks are then moved to the packing room where the frozen bread loaves are put into cartons. From there the cartons are taken to the storage room (Fig. 2) where the frozen bread is kept at zero F. until it is shipped in refrigerated trucks to Arnold distributors in cities beyond a 400-mile radius of Port Chester. Within the 400-mile radius, Arnold's distributors generally do not sell the frozen products.

The new plant cost approximately $110,000. It covers nearly 9,000 square feet. Designed to provide 12,000 cubic feet of refrigerated storage space in addition to the quick-freezing room, the packing room, a truck bay, and the compressor room. Provisions are incorporated for possible expansion later.

Refrigeration Plant

The refrigeration plant consists essentially of the following features: a

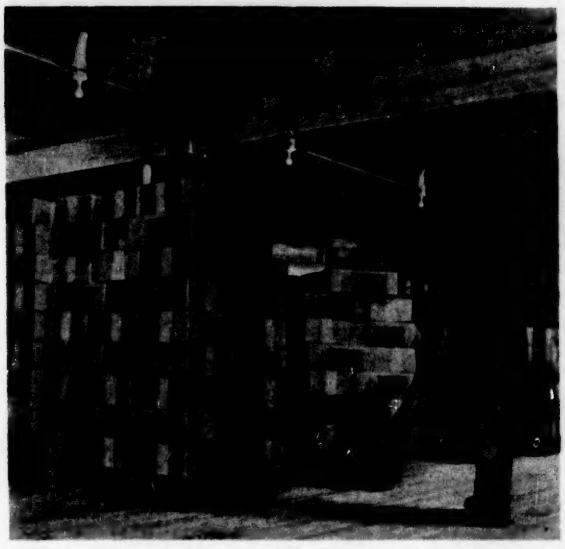

Fig. 2 — Storage room of new refrigeration plant recently put into operation by Arnold Bakers.

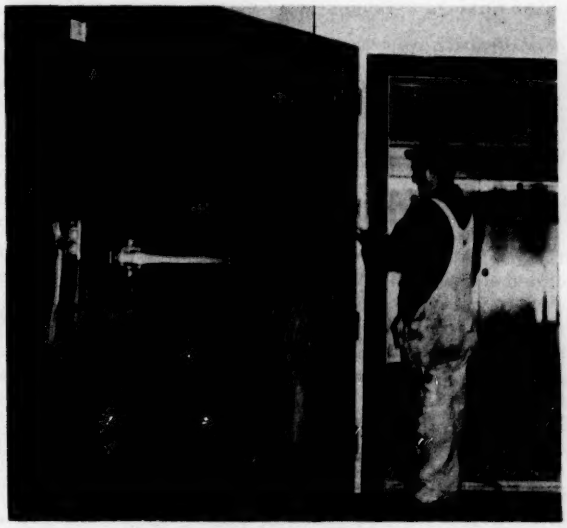

Fig. 3 — Workman checks main door to freezer room of new Arnold Bakeries plant.

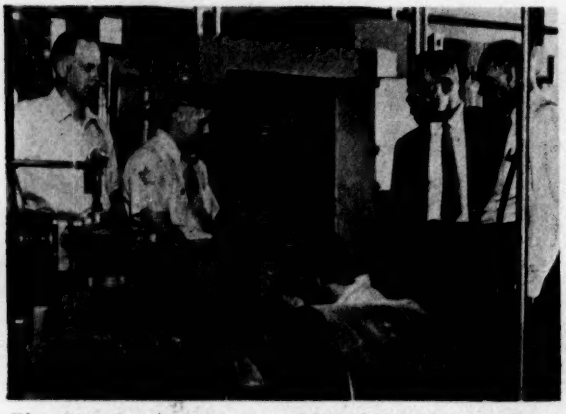

Fig. 4 — Service man sets switch for initial operation. Refrigeration specialists responsible for installation of equipment look on with Leonard Patridge, director of engineering for Arnold.

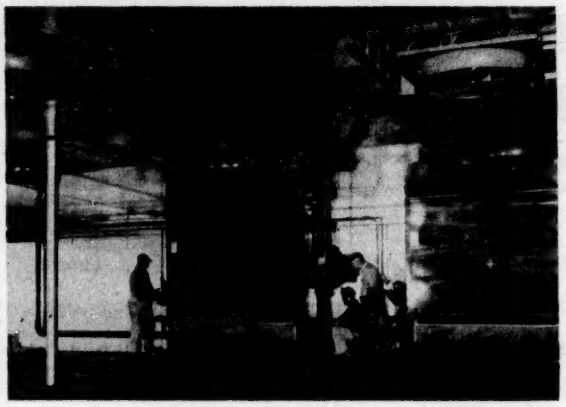

Fig. 5 — View of Niagara "No-Frost" spray-type air units in freezer room. Air is delivered to ceiling plenum, where circulation is augmented by axial-vane fans. Provision is made for a third air unit at the left.

freezing room, for rapid freezing of wrapped products on racks; a storage room, for storage of product in shipping cartons; a packing room located between the freezing and storage rooms, equipped with an underfloor heating system; a machinery room, which contains the compressors, evaporative condenser, main control panel and concentrator for the Niagara "No Frost System"; an office space, which also includes a gas fired steam boiler for heating purposes and other steam requirements; and, an enclosed truck ramp with rolling door for entrance and exit of loaded trucks.

The entire cold box area, consisting of the freezing, packing and storage rooms is entirely enclosed by insulated walls, ceiling and floor. Doors (see Fig. 3) are provided between the packing room and the freezer and storage rooms located at opposite sides of the packing room, in addition to regular access.

Freezing Room

Approximately 40 x 40 x 10 ft. high, the freezer employs hardwood floor over Fiberglas insulation, an unusual feature in today's construction.

Two finned coil Niagara spray units equipped with air circulating fans and a spray pump move refrigerated air over the product. A plenum chamber provided in the ceiling of room is equipped with seven ¾ hp fans for additional circulation (see Fig. 5). Fans are controlled manually, and are rated at 11,000 cfm each. Provision is made for installing additional fans when increased capacity is required. In the air units, the spray solution is "No-Frost" liquid. Their capacity is seven tons per unit, with normal air circulation of 11,000 cfm per unit.

Freezing capacity of this room is 1,000 lbs. per hour at minus 20 F. Controls employed are two thermostats, range of minus 50 to 20 F. for controlling operation of compressors; an additional thermostat set at zero F. is provided to operate a warning light on main control panel.

Storage and Packing Rooms

Of the same size as the freezer, the storage compartment also has a hardwood floor, and one finned-coil spray unit. Capacity of this unit is four tons, with a normal air circulation of 3750 cfm. Unit is equipped with two directional outlets at ceiling. Controls are a thermostat with range of minus 20 to 50 F to control compressor operation; an additional thermostat set at 10 F will operate a warning light on main control panel.

Packing room is 15 x 40 x 10 ft. high with concrete floor over insulation. An underfloor heating coil makes work within the room more comfortable. Coil consists of four pipe grids with ¾ inch pipe spaced 12 in. o.c. Fuel oil is circulated in the pipe coils at 70 F at minimum rate of 12 gpm.

Conveyors are provided to handle product from quick freezing room to packing room, and packed cartons from packing room to storage room.

Refrigeration Equipment

Two compressors are required for the quick freezing room, which employs a two-stage system. First stage compressor is a Fuller rotary unit with 206 cfm displacement, operating at 5.5-inch vacuum to 37 psi discharge. A 30 hp motor is employed using a vee-belt drive.

The second stage compressor is a Carrier multi-cylinder reciprocating unit with 73 cfm displacement, operating at 37 psi suction and 125 psi discharge. A 25 hp motor-belt drives the unit. "Freon 12" is the refrigerant. Only one Carrier multi-cylinder reciprocating compressor is required for the storage room and is equipped with 10 hp motor and vee-belt drive.

An evaporative condenser consisting of two circuits of 18.7 tons capacity for the quick freezing room and 5.1 tons capacity for the storage room is provided. Air inlet and outlet ducts are provided for circulation of outside air, and equipped with automatic by-pass dampers for recirculation in colder weather. A single fan and circulating pump are provided.

Concentrator for "No Frost" solution, complete with spray pump, filter box, heating coil, and fan with moisture removal capacity of 15 gallons per hour is located in the Machinery Room. Sump tank for spray solution is 30 x 36 x 36 inches high. A supply pump and feed pump operate in conjunction with the concentrator. A heat exchanger is utilized to control temperature of the spray solution.

Space is provided in the compressor room for additional stages of compression, for increased freezing capacity and for use in conjunction with a future storage room.

Heating System

The requirements for space heating and other steam requirements are handled by a gas fired boiler rated at 280,000 Btu per hour. The steam requirements consist of: unit heater for the office — on thermostat control; unit heater for the compressor room — on thermostat control; heat exchanger for heating the

(Continued on page 51)

Costs of Operating Heat Pump

A twelve-story office building in Portland, Oregon is heated and cooled by heat pump application, without coal, gas or oil consumption. Electrical energy costs of this application.

J. DONALD KROECKER
RAY C. CHEWNING
Professional Engineers
Portland, Oregon.

THE performance of the heat pump installation for year 'round air conditioning of the Equitable Building in Portland, Ore., has been observed for a period of one year.

Derivation of the cost of operation, segregated with regard to heating and cooling, of a heat pump system controlled automatically and providing heating and cooling simultaneously is complex and requires analysis and understanding of a large number of factors; namely, (1) the building; (2) use as affecting design, costs and operation; (3) the heat pump system; (4) basic differences between a heat pump and a conventional system as affecting costs; (5) heating and cooling load distribution.

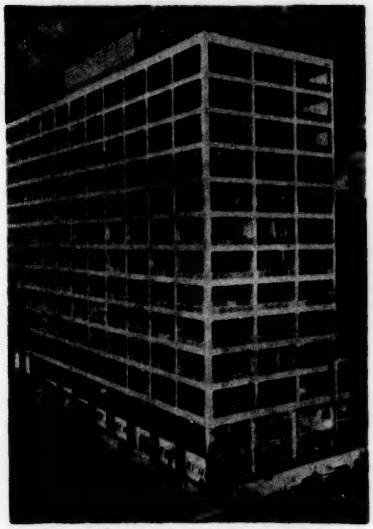

Fig. 1—The Equitable Building

Further considerations require comparisons of operating costs with those of conventional separate systems for heating and cooling, conversion of final cost figures to rate schedules in other cities, and recommendations for consideration of heat pumps to larger buildings.

Reprinted from paper presented at 60th annual meeting of The American Society of Heating and Ventilating Engineers, Houston, Texas, January, 1954.

Heating a twelve-story office building with a floor space of 212,000 square feet without coal, gas, or oil, a feat deemed impossible a few years back, is now a reality. This fact is established in this article describing the cost performance of the installation in the Equitable Building in Portland, Oregon. Interest in the article is heightened by the fact that this building presented a severe test to any heating and ventilating system, with 128,711 square feet in rentable space subject to rearrangement by tenants and an extra large number of windows flush with the building face and extending from column to column. J. Donald Kroecker and Ray C. Chewning, consulting engineers of Portland, Oregon, prepared the report with details of energy cost for heating and cooling; also cost of maintenance and operation.

Building Description

A 12-story office building with a basement and two penthouse levels, the building, Fig. 1 rises 200 ft above the street, is 200 x 100 ft. in area at the street level and 62 x 200 ft. at the third floor level and above. It has a floor space of 212,000 sq. ft. (of which 148,711 sq. ft. is rentable space) and a volume of 2,275,000 cu. ft. Architecturally, it includes many innovations. It is the first all-aluminum clad office building in the United States. The windows are double glazed, extend from column to column, and are flush with the building face throughout. The external panes of the windows are of heat-absorbing type glass. (Fig. 1).

Air-System Use Affects Design and Cost

The Equitable Building is a rental office building throughout. This had a bearing on system selection. Since each square foot of rentable space is revenue-producing, mechanical rooms on floors were eliminated. Since rental buildings may be subject to space rearrangement at any time, an all-air system was designed to eliminate the need for subsequent rearrangement of mechanical features, and to provide means of effecting conservation and use of heat which would normally not be recoverable. Provisions for any desirable space rearrangement required was obtained by zoning by exposures rather than by rooms.

The habits of the occupants have a material effect on costs. The building is in use from 8 a.m. until 10 p.m., hence the time of operation is longer than usual. The building's electrical demand, exclusive of the heat pumps, has peaks at approximately 11 a.m., 1 p.m., and 4 p.m. The first and third peaks are due to capacity elevator operation accommodating occupants in their indulgence of the American coffee habit. If heat pump peaks during these periods can be avoided, consequent demands chargeable to the operation of the heat pump are reduced.

Air Conditioning System

The building is completely air conditioned. A simplified diagram of the system is shown in Fig. 2. The heat pump which furnishes the heating and cooling is composed of four centrifugal water-chilling machines. Well water is the heat source. Wells not being pumped are used for disposal.

The system consists of the following: Twelve air conditioning units, comprised of fans, heating and cooling coils delivering air to plenums, from which air is mixed at the command of room thermostats in several

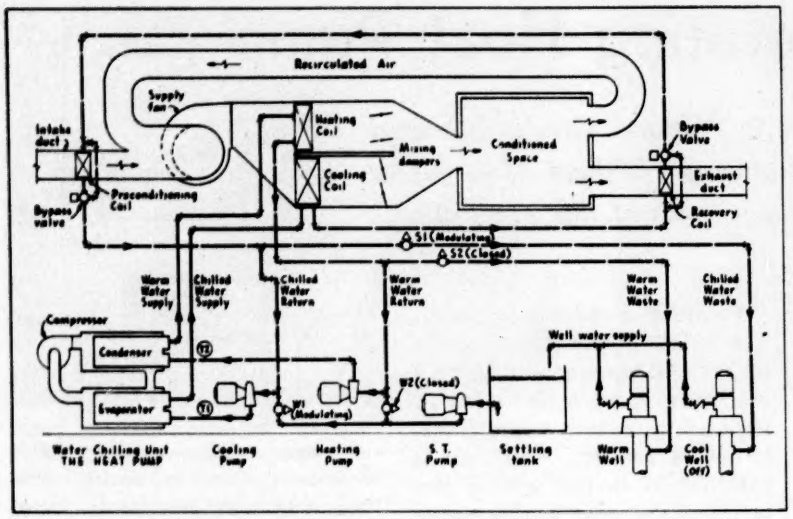

Fig. 2—Flow diagram of the heating and cooling system with valves positioned for flow when heating load is greater than cooling.

zones per floor; a recovery coil in the exhaust air; two preconditioning coils, each to supply ventilation air to several conditioning units; four heat pumps; other pumps (illustrated); a settling tank, to collect sand, if any from well water; two warm wells for disposal during cooling; one cool well for disposal when heating is greater than cooling.

Heating Operations

During periods when heating is greater than cooling, the following operation is generally applicable (Fig. 2): The warm water supply and return system is a closed circuit in which water is circulated by the heating pump; the warm-well pump supplies water to the settling tank pump; the ST (settling tank) pump supplies water through valve W1 and the cooling pump (as required by thermostat T1) to the evaporator where heat is absorbed by chilling; chilled water is supplied to the cooling coils.

Water discharged from the cooling coils passes through a recovery coil, absorbing heat from exhaust air; thence to the preconditioning coils, where incoming ventilation air is heated by this waste chilled water. The chilled water is then wasted to the cool well casing through valve S1. The amount wasted is equal to that injected by the ST pump, the remainder being recirculated by the cooling pump.

The temperature control for air conditioning and the heat pump is somewhat more complex than ordinary. Heating and cooling are both available whenever the outside temperature is below 70 F. Well water from warm wells is injected into the evaporator circuit of the heat pump units whenever the heating load is the greater, and from the cool well to the condenser circuit whenever the cooling load is greater. The system is completely automatic, except that to start the system is manual. Accordingly, well water sources, operation to introduce well water, and capacity in operation are selected automatically.

Heat Pump Characteristics

The significant difference between a heat pump and a conventional system, in which refrigeration is used for cooling and oil, gas, or other energy is used for heating, is the fact that, with a heat pump, heat may be obtained as a by-product anytime the system is in operation to obtain cooling. This factor, of great importance in the economical consideration of the heat pump as a heating system was exploited in the Equitable installation.

In a building such as this there are areas which require cooling even when the outside temperature drops to the design condition of 10 F. Usually, cooling loads occurring during normal heating periods are handled by the introduction of cool outside air.

In the Equitable Building this was not possible, because the space allotted to the mechanical equipment was such that it would have been impossible, without reducing the rental space for each floor, to arrange the duct work to bring in the necessary outside air and to control it to prevent drafts from air which was too cool. Further, the cost of installation would have been considerably more to provide that type of system. Thus, if instead of a heat pump a conventional system with separate heating and cooling sources had been used in this building, the cooling equipment would have run every day of the year.

Studies show the minimum cooling load in the building to be in the neighborhood of 125 tons. Therefore, comparing the heat pump system with a conventional type system, it becomes apparent that the refrigeration machinery would have operated to perform a cooling function even though the heating load was considerably in excess of the cooling load. Since heating is done with the heat rejected from this cooling load, this quantity of heat is a by-product of cooling and the energy required to obtain that quantity of heat can be charged to cooling.

Cost Study Instruments

Data on the electrical characteristics of the pump and the building were obtained by the use of recording, integrating, electrical demand meters, Fig. 4. Installed by the local power company on a temporary panel, they enabled collection of data from water chiller (the heat pump), settling tank pumps, heating and cooling circulating pumps, warm and cool well pumps. The recording meters for the mechanical system, Fig. 3, are a permanent part of the system and were installed during construction.

A recording demand meter for the building was also installed in the spring of 1949, when the meter became available. Meter troubles resulted during the following heating seasons, so that the period from April 30, 1952 to May 1, 1953, was the first for which complete and unbroken records were available.

With these meters the following electrical demands and consumptions were determined: the master meter could measure all energy used in the building; data on energy use for the building, exclusive of the heat pump

and auxiliaries, could be obtained by subtracting the totals obtained from their recorders, from readings of the building master meter; energy used by the heat pumps, settling tank pumps, heating and cooling circulating pumps and the warm and cool deep well pumps could be read directly; periods chargeable to heating and to cooling could be determined from meters on warm and cool well pumps.

The energy required for the fans in the several conditioning units could not be measured separately, because the wiring as installed makes segregation impractical. It was included in the general building energy figures.

Analysis Methods

The kilowatt and kilowatt-hour data for the building and the system were obtained from the demand meter charts after mounting them on a device specially-constructed to permit simultaneous examination of all seven meter records for any given month. Hour-by-hour data were thus studied on a total of 670 ft. of electric demand charts to obtain both electrical demands and energy use for the building and each group of equipment recorded by the meters.

Maximum monthly electrical demands were found by inspection. A check was then made to determine whether heating or cooling was the greater when the maximum demand for the month was established. This was done by inspection of the cool and warm well records.

Cooling Charges

When it was found that cooling was greater when the maximum combined demand was set for the month, the breakdown was made as shown for June in the first half of Fig. 5; namely,

The maximum combined demand was recorded for the month at 2:30 p.m. on June 26; consisted of building demand and demand of equipment to provide cooling.

The combined demand at a time when the demand for the building only was maximum was recorded at 3:30 p.m. on June 27.

The next bar in the graph shows the portion of the maximum combined demand for the month chargeable to cooling; namely, the difference between the maximum combined demand for the month and the maximum demand for the building only.

Cooling is charged with only that portion of the maximum combined demand for the month which is in excess of the demand which would have been established had there been no cooling in the building.

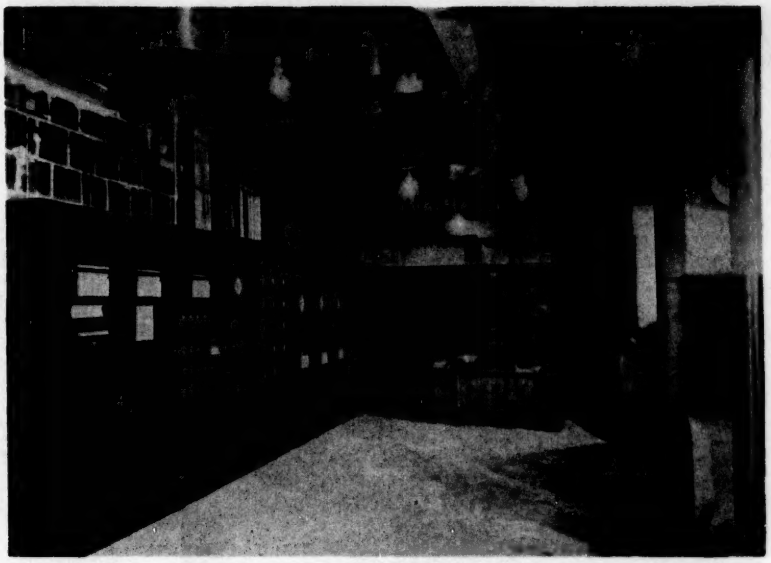

Fig. 3—Main mechanical room, showing heat pumps at right and control panels with permanent recorders and operating control at left.

Charges for Heat Plus Cooling

When it was found that heating was the greater when the combined demand was maximum for the month, the breakdown was as shown for January in the second half of Fig. 5; namely,

The maximum combined demand was recorded at 11:00 a.m. on January 26.

The maximum combined demand occurring when cooling was greater than heating was recorded at 2:30 p.m. on January 12.

The maximum demand for the building was recorded at 10:30 a.m. January 15.

The last bar in the graph shows the difference between the maximum combined demand when cooling was the greater and the maximum for the building alone was charged to cooling; the difference between the maximum combined demand for the month and the maximum demand when cooling was the greater was charged to heating.

This analysis procedure was used because the first requirement for consideration of heat pump use is the decision to include cooling in the building design. The decision to use either the heat pump, or a conventional cooling system with conventional heating for building air conditioning is made by determining heat pump operating costs. The heat pump, then, is charged only with that portion of the maximum demand which is in excess of the demands by conventional cooling system. The demand established by a heat pump when the cooling is greater than the heating, is the same as would be established by a conventional cooling system. Again, the cooling demand estimated should be only that portion of the maximum demand established with cooling greater than heating which is in excess of the maximum demand that would have been established by the building if there had been no cooling system.

By-Product Heat Over One-Third of Needs

A summary of electrical demands and energy use by months is given in Table 1. Segregation of operating time and electrical consumption to types of operation was necessary to determine amount of energy used for heating but chargeable to cooling as by-product heating. (By-product heating is considered the heat rejected during minimum cooling.)

The energy rejected to heating during minimum cooling was considered that effective during ideal transfer conditions; namely, a high chilled water temperature and a low condensing water temperature. In practice such conditions are not effective during applicable periods. However, they would be effective in a conventional system.

Accordingly, the correction was made by determining the energy required by the heat pump to produce

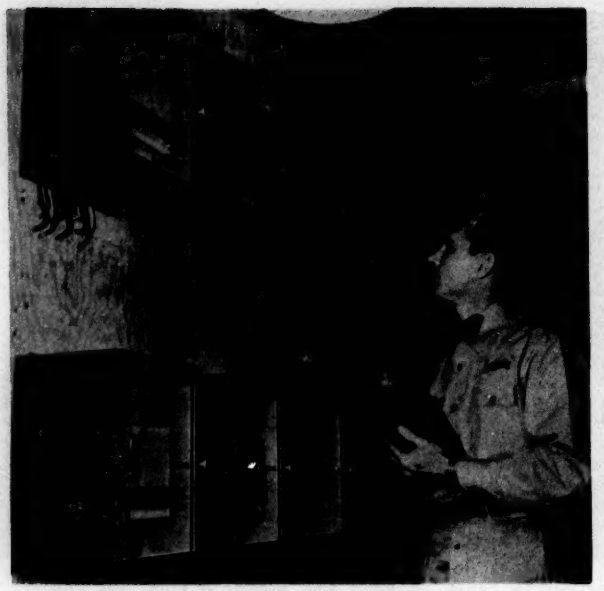

Fig. 4 Above Recording electrical demand meters installed to enable cost determinations.

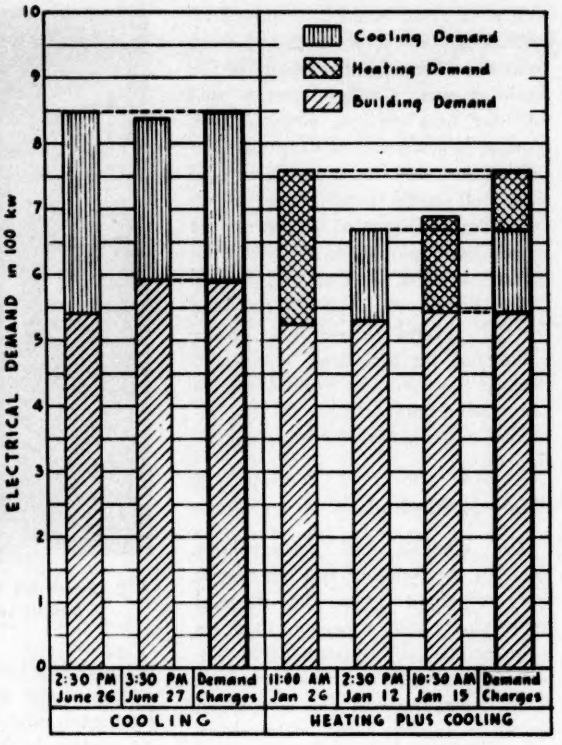

Fig. 5 Right—Breakdown of demands chargeable to heating, cooling and building only.

the necessary cooling effect with a chilled water temperature of 50 F and a condensing temperature of 85 F, and multiplying this quantity by the hours of operation with heating greater than cooling. Of a total heating requirement for the year of 243,801 kwhr (total of kwhr cols. 1 and 2), 89,370 kwhr or 37 percent is obtained as a by-product of cooling.

Cost Derived

The rate schedule applicable to the computation of power cost is shown in Table 2. In calculating costs, kilowatt-hours were charged at the rate of 3.3 mills per kilowatt-hour, the last block in the schedule. The demand was charged at the full rate of $1.10 per kilowatt without any deduction. This is considered proper because air conditioning, whether by conventional methods or by a heat pump, is a load added to the building after application of the general necessary electrical uses, such as lighting, elevators, etc.

A break-down of electrical costs according to type of operation is shown in Table 3. Energy consumption for heating, while generally following degree-days, departed from direct relationship in January and February due probably to sun effects and to more use of manual night time operation. Costs paralleled demands more closely than they followed energy consumption.

The total cost due to demand charge for the year, Table 3, was $3,507.68, while the cost due to energy use is only $2,968.27. These figures demonstrate the fallacy of estimating electrical costs for heat pump systems on the basis of kwhr required to run the equipment.

Operating Costs on Sq. Ft. Rental Basis

The cost of energy per square foot of net rentable area, 148,711 sq. ft., developed as ½ cents for heating

TABLE 1—ANALYSIS OF ELECTRICAL DEMANDS AND ENERGY USE

Month	Htg Deg Days	Operation: Time (Hrs.) Htg	Man[a]	Clg	Consumption (Kwhr) Htg	Man[a]	Clg	By-product[b] Heating	Corrected Consumption (Kwhr) Htg	Clg	Electric Demands[c] Htg	Clg
May	198	32	—	322	4,694	—	61,321	2,880	1,814	64,201	—	282
June	122	2	—	344	328	—	74,863	180	148	75,043	—	259
July	12	—	—	429	—	—	110,512	—	—	110,512	—	367
August	8	—	—	409	—	—	106,205	—	—	106,205	—	353
September	49	—	—	362	—	—	94,981	—	—	94,981	—	350
October	126	12	—	344	1,737	—	73,435	1,080	657	74,515	—	295
November	653	170	145	121	28,023	15,354	14,783	15,300	28,077	30,083	—	200
December	654	256	152	64	36,329	15,695	6,591	23,040	28,984	29,631	90	114
January	505	190	61	118	26,753	5.044	13,134	17,100	14,697	30,234	90	107
February	544	149	231	145	25,360	24,163	18,039	13,410	36,113	31,449	60	149
March	543	124	208	229	20,343	18,617	34,467	11,160	27,800	45,627	—	203
April	394	58	126	316	9,727	11,634	47,343	5,220	16,141	52,563	—	270
Total	3808	993	923	3203	153,294	90,507	655,674	89,370	154,431	745,044	240	2949

[a]Equipment on manual heating; [b]Kwh; [c]Kw

TABLE 2—ELECTRICAL MONTHLY RATES *(Schedule 32, Portland General Electric Co.)*

	From	To	Cost
Demand Charge	0	10 Kw	None
Dollars Per Kw	Excess above	10	$1.10
	0	150 Kwhr	Cents 3.30
	150	500 "	2.20
Energy Charge	500	1500	1.10
Cents Per Kwhr	1500	15,000	0.88
	15,000	40,000	0.66
	40,000	100,000	0.44
	Excess over	100,000	0.33

and 3-7/8c for cooling, or a total for heating and cooling 4-3/8 cents.

While the kilowatt demand charge forms much the larger portion of the cost of air conditioning as a whole, it is approximately ½ the total cost of heating. This is due to the fact that only that amount of the heating demand charge which is in excess of the largest cooling demand charge occurring during any given month is charged to heating, and is also due to the fact that the largest demands for heating energy generally occur at a time when the general building demand is very low. Heating exerts its heaviest demand during the early morning hours between 6 a.m. and 9 a.m. when the general building load is at a minimum. Conversely, the cooling demand occurs at a time when the building demand is at a peak.

Total Operating Costs

Total costs of operation of the air conditioning system include fan operation, salaries for operating personnel, maintenance and repair, and cost of water treatment. These costs, together with segregation to heating and cooling, are shown in Table 4.

The cost of energy required for operation of the fans was not included in the analysis of the cost of operation of the heat pump, because the fans were not considered a part of the basic heat pump system. However, in order to present a true picture of the complete cost of air conditioning, it was necessary to include the cost of energy supplied to the fan motors. Means of metering the power to the fans was not available. A good estimate of the power required for the fans was obtained by a knowledge of the types of fan operation possible and by use of the general building demand recorder.

Three types of fan operation are possible: Operation with all outside air intake and exhaust fans off when the building is unoccupied, for the purpose of maintaining minimum temperatures; with normal outside air and exhaust fans on; with 100 percent outside air and exhaust at temperatures of 60 F, for the purpose of obtaining reduced operation of the heat pump.

The power required for the fans was determined from the general building meter by shutting off all uses of electricity in the building and reading the demand made by the fans for each type of operation. The requirements were 53 kw for operation without outside air, 67 kw for normal operation, and 83 kw for 100 percent outside air operation. Since fan power requirements are quite constant, the knowledge of the demand and hours of operation were sufficient to make an accurate estimate of electrical use and costs.

Table 3—Analysis of Electrical Costs For Heat Pump Operation
(Cost in Dollars)

	Energy Used			Demand of Kw			Total		
	Heating	Cooling	Total	Htg	Clg	Total	Htg	Clg	Total
May '52	5.99	211.86	217.85	—	310.20	310.20	5.99	522.06	528.05
Jun.	0.49	247.64	248.13	—	284.90	284.90	0.49	532.54	533.03
Jul.	—	364.69	364.69	—	404.14	404.14	—	768.83	768.83
Aug.	—	350.48	350.48	—	388.08	388.08	—	738.56	738.56
Sep.	—	313.44	313.44	—	384.56	384.56	—	698.00	698.00
Oct.	2.17	245.90	248.07	—	324.94	324.94	2.17	570.84	573.01
Nov.	92.65	99.27	191.92	—	219.56	219.56	92.65	318.83	411.48
Dec.	95.65	97.78	193.43	99.00	125.84	224.84	194.65	223.62	418.27
Jan. '53	48.50	99.77	148.27	99.00	117.48	216.48	147.50	217.25	364.75
Feb.	119.17	103.78	222.95	66.00	164.12	230.12	185.17	267.90	453.07
Mar.	91.74	150.57	242.31	—	223.30	223.30	91.74	373.87	465.61
Apr.	53.27	173.46	226.73	—	296.56	296.56	53.27	470.02	523.29
Total	509.63	2458.64	2968.27	264.00	3243.68	3507.68	773.63	5702.32	6475.95
Total Energy cost per sq. ft. of Rentable Space (cents)							0.52	3.85	4.37

Personnel Overhead

The amount shown for total salaries of operating personnel is based upon one-half the total time of a chief operating engineer and two assistants. Many duties connected with the general building and the plumbing maintenance performed by these men were estimated as leaving one-half of the salaries chargeable to air conditioning. Maintenance and repair costs include materials or work performed by others, who were not operating men. Approximately 25 percent of this item is involved in filter service.

Several methods of segregating costs, other than energy, for heating or cooling were justified as follows:

Fan energy was 92.4 percent to cooling for three reasons: (1) cooling was the basic scheme, (2) cooling occurred at all times except during manual heating, and (3) the air systems to which the fans are basic were selected primarily because cooling was a prime requirement. Fan energy was thus charged to heating for periods of manual heating.

Operators' salaries, and maintenance and repair, could not be apportioned to heating and cooling on the basis of demands or energy consumptions. Accordingly, the breakdown represents values justified by the chief operating engineer.

Water treatment would have been unnecessary if water only from the cool well had been used; accordingly, the cost is charged to heating.

Total costs per square foot of net rentable area developed as 2+ cents for heating and 9+ cents for cooling, or a total of 11-1/3 cents for air conditioning.

Limitations of Data

The accuracy of data presented was affected by several factors beyond control: The recorder chart multiplier for the mastermeter was 1000 and the reading accurate to only two significant figures. Combined electrical demand values were to only the nearest 10 kw.

The values for energy consumption, determined by planimeter from the charts, were not identical with metered values, although they were within a few percent of them; these loads could not be segregated with accuracy; the amount of sun effect,

Table 4—Total Costs[a] of Air Conditioning The Equitable Building
(From Apr. 30, 1952 to May 1, 1953)

Item	Description	Heating Dollars	Cooling Dollars	Total Dollars	Total Percent
1	Heating Energy	773.63	—	773.63	4.6
2	Cooling Energy	—	5,702.32	5,702.32	33.9
3	Fan Energy	161.50	1,961.64	2,123.14	12.6
4	Operators' Salaries	1,790.00[b]	5,370.00	7,160.00	42.5
5	Maintenance & Repair	136.00[b]	544.00	680.00	4.0
6	Water Treatment	400.00	—	400.00	2.4
7	Total	3,261.13	13,577.96	16,839.09	100.0
8	Total per NRA[c]	0.022	0.091	0.113	

[a]Does not include amortization of first costs.
[b]Breakdown as estimated by C. E. Graham, Chief Operating Engineer.
[c]Cost per year per square foot of Net Rentable Area.

TABLE 5—Comparisons of Costs of Energy of a Heat Pump System and a Conventional System in The Equitable Building

Heating Energy	Heating Cost		Cooling Cost	Total Cost
	Dollars	%	Dollars	Dollars
The Heat Pump System	773.63	100	5,702.32	6,475.95
District Steam*	4,930.00	638	5,702.32	10,632.32
No. 5 Fuel Oil*	3,430.00	444	5,702.32	9,132.33

*With separate cooling system as installed.

having a significant bearing on loads in a building with maximum glass areas, could not be satisfactorily indexed to relate to the data. (Weather Bureau designations available for downtown Portland are unsuitable for the purpose).

Equitable Plant Compared to Others

Discussions of heat pumps and their installations, operation, and costs naturally develop into comparisons with conventional systems of air conditioning buildings. The latter include heating systems using district steam or heating plants contained in buildings, together with cooling systems. Table 5 presents such a comparison. It is based on the all-air system installed in the Equitable Building using steam from a district steam system, or No. 5 fuel oil to provide hot water circulation to heating coils in the conditioning units and the preconditioning coils, instead of condenser water.

First costs of conventional systems are not estimated. The first cost of a plant using No. 5 fuel oil would include the cost of a boiler plant within the building and of a required chimney, and the annual costs would include annual value of the space required for boilers.

Annual costs are based on the heating and cooling loads developed for the Equitable Building, the local district steam rates averaging $0.85 per 1000 lb. and No. 5 oil at $2.71 per barrel. These values are based on comparisons of energy cost only, derived from average temperature data. Using district steam, which would have been used had a heat pump system not been adopted, the total cost of energy for air conditioning for the year would have been 65 percent greater. Table 5 also shows that the cost of energy for cooling was only 17 percent greater than the cost of district steam for heating only. The cost of energy for heating and cooling the Equitable Building was only 31 percent greater than the cost of district steam would have been for heating only.

Portland district steam rates are relatively low. If estimates or district steam use for the Equitable load were based on rates in other cities, instead of the average rate of $0.85 per 1000 lb., they would be developed at $1.46 for New York, $1.15 for St. Louis, $1.52 for Seattle, $1.64 for Chicago, and $1.43 for Minneapolis, the average rates given in the 1952 report of the Operating Statistics committee of the National District Heating Association.

Comparison of Energy Rates With Other Cities

Electrical rates for the Pacific Northwest are exceptionally low. Table 6 is a conversion of costs to rates of other cities considered applicable; namely, San Francisco, St. Louis, Chicago, Minneapolis, and Seattle. The rates on demand charges in other cities are understood to be based on the maximum 15-min integrated demand occurring in a month instead of the 30-min basis used in Portland. The comparisons are based on quantities developed for the Equitable Building, Table 1, without conversion by degree-day ratios to these cities. Approximate conversions of heating costs by heating degree-day ratios, if made, should be considered accurate to no more than plus or minus 15 percent.

Adaptation of a similar heat pump system to another location is attended by consideration of other physical factors requiring individual analysis not considered here. These include availability of well water, practicability of disposing to a stratum not being pumped, sewer charges if disposal to ground is impracticable, and water charges if well water is not available at reasonable cost. Use of city water as a heat source generally will rule out economic feasibility.

TABLE 6—Comparisons of Costs of Energy at Electrical Rates of Other Cities

City	Schedule*	Heating Dollars	Cooling Dollars	Total	
				Dollars	Percent
Portland		773.63	5,702.32	6,475.95	100
Seattle	Commercial	1,256.58	8,374.83	9,631.41	148
San Francisco	A-13	1,481.15	8,862.44	10,343.59	160
St. Louis	Large L & P	1,415.53	9,222.65	10,638.28	164
Chicago	Large Commercial	1,132.45	8,529.18	9,661.63	149
Minneapolis	Large Commercial	1,963.53	12,559.37	14,522.90	224

*From National Rate Book of the Federal Power Commission.

Technical Speakers at Jubilee Program

THE Technical Jubilee to be held at Columbia University in connection with the bicentennial of the University will also observe the tenth anniversary of The Refrigeration Research Foundation. The Foundation will be represented on the program by two speakers: Dr. S. C. Prescott as Chairman of the Board, and Eugene F. Jansen of the United States Department of Agriculture Western Utilization Research Branch at Albany, Calif., who will deliver an address on the time-temperature research facilities and experimentation on frozen foods, one of the major research projects which the Foundation has helped to sponsor during its existence.

The president, W. A. Sizer of Chicago, and the Director, Dr. H. C. Diehl will also officially represent the Foundation on this occasion. Foundation members who are in New York City during that time are cordially invited to attend.

Refrigerated Warehouses Receive Safety Awards

THE COLONIAL Ice Company, Savannah, Georgia; Jax Ice and Cold Storage Company, Jacksonville, Florida, and the Terminal Warehouses of St. Joseph, Inc., St. Joseph, Mo., have been awarded Safety Certificates for outstanding plant safety records by the National Association of Refrigerated Warehouses.

The plants qualified by going one year without a lost-time industrial accident. Including these latest awards, a total of 45 refrigerated warehouses have received safety awards since NARW launched its industry-wide campaign last year.

Storage Fundamentals For Frozen Foods

ROBERT E. REIMAN
Modern Freezing & Storage Co.
Corvallis, Oregon

EARLY as 1865, fish were frozen commercially on ice in the Great Lakes region, and in the same year the first refrigerated warehouse was built in New York City, cooled by natural ice crushed with salt. The first refrigerator railroad cars were built in 1868. In 1870, poultry was frozen with air from a solution of ice and salt.

In 1875, a French ship was fitted for cold storage, to hold freezing temperatures even below the equator, and sailed from France to South America with a cargo of meat which arrived in excellent condition three months enroute. Small fruits and berries were first frozen commercially between 1905 and 1910, but commercial freezing of so-called quick frozen foods did not start until about 1929. The first volume packs of pre-cooked frozen foods did not begin until 1942.

Although the use of cold to preserve foods has been used for centuries as an art, the science of preserving foods by freezing and refrigerated storage is of recent origin and, today, research is constantly revealing to us new factors and devel opments to enable us to provide better frozen foods for the family dinner table.

Food Quality Phases Grower to Consumer

In providing improved quality frozen foods for the American consumer, there are five definite phases in the process which affect their quality: 1) growing and harvesting the product, 2) processing, 3) freezing and packaging, 4) storage, and 5) distribution and handling.

Certain definite fundamentals must be observed in each phase of this production to obtain the best end product. All must be coordinated for maximum result. And each phase is singularly important to the make-up of the whole.

It is the fourth step, of course, with which this article deals: To properly consider frozen food storage fundamentals it will be best to trace the temperature history of the product through its life (Fig. 1).

As an example, select corn. There are wide temperature variations in the life of a frozen corn kernel.

From Fig. 1, it may be observed that time in storage is the longest single element in this history. From this it will be realized the importance that conditions of this storage period hold over the overall quality of the product.

Fundamentals of Freezer Storage

Fundamentals emphasized in this paper on the importance of proper storage of frozen foods are:

1. Temperature minus 0 F, or lower.

2. Uniform and even temperature, with minimum of variation.

3. Relative humidity — maintain as high as possible.

4. Air circulation — uniform and even distribution at minimum level, directed across room surfaces and not food surfaces.

5. Merchandise out of contact with walls, floors and ceilings.

6. Eliminate all unnecessary heat loads.

7. Do *NOT* freeze fresh products in same room with stored merchandise.

8. Bring frozen goods down to storage room temperature before they are stacked in a tight pile.

9. Handling outside of storage rooms must be done rapidly.

Analyze what occurs to the product, or can occur, during this storage period. What are the causes and preventions, or what are the fundamentals of proper storage?

Detrimental Factors

Four major detrimental effects that can occur to a frozen food product while held in storage are: (1) moisture loss—dehydration or dessication; (2) oxidation, causing rancidity; (3) ice crystal growth with corresponding tissue rupture; and (4) loss of vitamins and food value through chemical and enzyme action. Then, to provide proper storage for frozen foods, we must design, utilize and operate our freezer storage warehouse to minimize and eliminate these major detrimental effects.

Of course, some of these detrimental effects are caused and occur from a previous operation. However, assume that the product comes to the storage warehouse in the best possible condition. Consider the first enemy — moisture loss. Dehydration of frozen food in storage is affected by: 1) types of packaging, 2) humidity conditions of the storage air, 3) temperature variation of the storage room, and 4) air circulation around the stored product.

The warehouseman has no control over the type of packaging used on the product, but he is responsible for storage temperature, humidity conditions and air circulation conditions. The lower the relative humidity in the storage room, the more moisture that air can pick up from its surroundings, carry to the coils and ultimately dollars down the drain. Also, the lower the humidity, the greater is the vapor-pressure differential between the product and the air, and therefore the greater the pressure that is exerted to tend to drive the product moisture through the packaging material.

Dehydration Within Sealed Containers

"How can temperature fluctuations in the storage room cause moisture loss from the product?" It can and

Paper given before 33rd Annual Food Processors' School, Oregon State College.

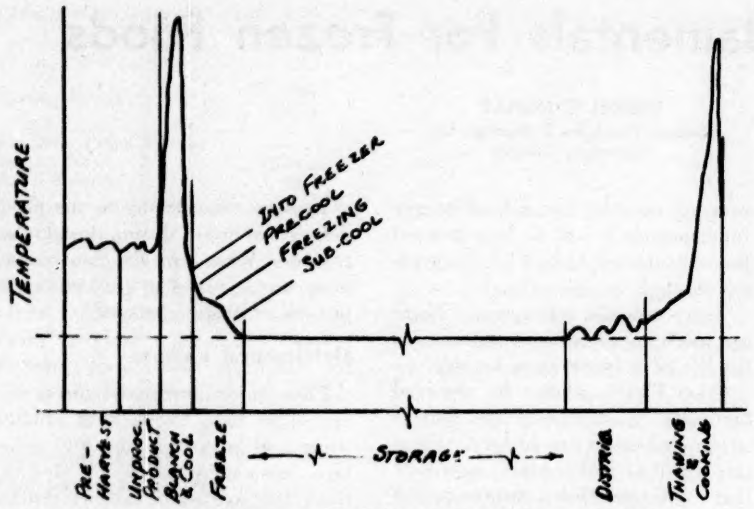

Fig. 1 — Frozen Food Temperature History, From Plant to Mouth.

does cause product dessication, although not at first apparent. Temperature fluctuations of the air cause the metal surface of a 20 lb. net rhubarb tin to vary in temperature. When the container becomes colder than the product, moisture is drawn from the product, condensing the freezing on the inner surface of the container. When the container surface becomes warmer, the tendency is for the moisture vapor to be drawn from the container surface back to the product. *But it cannot re-enter the cell tissue from whence it came* and simply deposits as ice on the outside of the product. Thus the product is dehydrated, even though the container of rhubarb still weighs 20 lb. net. Continual temperature fluctuations such as this serve as a pumping action, removing moisture from the product.

Air circulation is a factor in moisture loss from frozen foods in storage. Through the laws of evaporation, the higher the face velocity of air moving across a surface, the greater the rate of evaporation of moisture from that surface. In other words the more air circulating around the product, the more moisture that can be picked up by the air.

The second enemy, oxidation, is a factor over which the warehouseman and warehouse storage conditions can be said to have little or no effect, except that the simple chemical reaction of oxidation is retarded as temperature is decreased. In other words, the warehouseman's responsibility is simply to maintain the proper storage temperature. The key to this problem of oxidation lies primarily with the packaging and sealing of the product.

Expanding Ice Crystals

The third enemy, ice crystal growth in the product during storage, causes tissue and cell wall rupture and a corresponding loss of juices from the product upon thawing. In some products this is more undesirable than others. Nevertheless, it is a phenomenon which can be minimized by proper freezer storage practices. Ice crystal patterns are definitely formed during the freezing process. The more rapid the rate of freezing, the smaller are the ice crystals formed in the product cells.

Under uniform conditions of temperature and pressure, these ice crystals will remain relatively unchanged. But variations in temperature conditions in the product after freezing, will cause these ice crystals to grow and increase in size; consolidating, so to speak, and becoming larger and fewer.

Loss of vitamin content and food value (fourth enemy) through chemical and enzyme actions, occur in proportion to the temperature at which the product is stored. Jenkins, Tressler and Fitzgerald* measured the loss of vitamin C during the storage of spinach, peas, broccoli, cut sweet corn, green snap beans and lima beans at temperatures of 16, 10, 0 and minus 40 F. If loss of Vitamin C is also representative of the loss of quality such as appearance, flavor and nutritional value, as many experts believe true; then it would be foolhardy as a general practice to store these vegetables at a temperature higher than 0 F for the usual periods of commercial storage.

Zero Storage For Quality

Similar studies on many other commodities have shown that a storage temperature of 0 F or below is essential for the proper storage of most frozen foods. Figures from the Refrigeration Research Foundation Commodity Storage Manual of 1952 back up this contention. (See Table 1).

It is obvious from these figures that storage temperatures of O F or below should be provided to properly store frozen foods for longer-time periods of storage. Practical considerations set most freezer storage temperatures at O F today, but minus 5 F is coming more in demand and usage.

Through this discussion of the four major enemies of frozen foods in storage, you have probably recognized the four major fundamentals of proper frozen food storage: (1) proper temperature; (2) uniform temperature, with the minimum of temperature variations; (3) maximum possible humidity conditions; and (4) minimum and uniform air

*ASRE Applications Data Book, 1952.

TABLE I—APPROXIMATE STORAGE LIFE OF CERTAIN FROZEN FOODS AT VARIOUS TEMPERATURES

Product Storage Time Without Noticeable Quality Change	Storage Temperature +10 F Months	0 F Months	−10 F Months
Corn on Cob	4-6	8-10	12-14
Asparagus	4-6	8-12	16-18
Beans	4-6	8-12	16-18
Peas, Cauliflower, Broccoli, Spinach, Lima Beans	6-8	14-16	24 or longer
Squash	12	24	36 or longer
Raspberries (unsweetened)	6-8	12	18
Raspberries (sugared)	8-10	18	24
Sliced Strawberries	8-10	18	24

distribution, with the least face velocity across the product.

Proper temperature is probably the most important of these fundamentals. But, it is also the most closely checked and watched; also, the most easily determined and the most obvious, simply by reading a thermometer. *Uniform temperature* in the storage room on the other hand, is usually less rigidly checked and enforced. In fact, some storages are not adequately equipped to maintain the unifrom temperatures necessary for *proper* storage of frozen foods.

If the plant is thermostatically controlled, the thermostat should be one which operated between close tolerance plus or minus one degree F at least. A five degree variation is too much, although it has been only in the last several years that reliable close tolerance thermostats for freezers have been available. Uniform temperatures can be suitably maintained by back pressure control of the compressor if the compressor capacity is properly balanced with the load. Many times, however, this is not the case and fluctuating temperatures result.

Other factors, affecting temperature uniformity are the condition and adequacy of the insulation, lights and motor loads, opening and closing of doors. Also, freezing in the storage room is not the ideal condition due to the temperature fluctuation caused by the freezing load in the room. All factors which can cause temperature fluctuations within the storage rooms should be minimized or eliminated when possible.

Humidity Control Practices

Humidity conditions in the storage room can be somewhat controlled by the operation of the warehouse, although the design and construction of the plant and equipment will determine the actual limits that can be achieved by good warehouse operating practices. However, several practices are possible whereby the best humidity conditions can be achieved.

Good Operating Practices

(1) Operate the plant at the highest possible suction pressure that will maintain the proper temperature.

(2) Operate the storage with the least heat load possible; install vestibules at doorways and keep doors closed as much as possible, keep lighting and motor loads to a minimum, and do not freeze fresh products in the storage rooms. Any other sources of heat should be eliminated or minimized. The object is to keep the refrigeration load in the storage rooms small, in order to keep the refrigerant coil surface as close to the air temperature as possible. The greater this difference in temperature between coil and air, the greater is the frost pick up on the coil and the lower the room relative humidity. Thus, the goal to be achieved is the lowest possible refrigeration load per cubic foot of refrigerated space.

(3) The lower the storage temperature in a given room, the better will be the humidity conditions. Some operators have reduced the dehydration effect in their storage rooms by lowering the storage temperature to minus 20 F. Economic conditions of cost usually do not justify this practice. It is better and in general more economical to insulate heavier, using storage temperatures of about minus 5 F, and closer refrigerant to room differential temperatures to provide the high humidity.

The relative humidity in frozen foods storage should be not lower than 85 percent and there are presently no commercially satisfactory methods for introducing humidity into a freezer storage. Proper design and good operation of the plant, are the only practical means of achieving good humidity conditions in the storage rooms.

Air Motion Dehydrates

Any *excessive air motion* within a storage room *has a dehydrating effect* upon the foods stored in it. Even with a very high relative humidity, rapid movement of air over the product has the same drying effect as lower relative humidities with very little air movement. In a room used only for storage of frozen foods, the best conditions of air circulation are generally considered to be obtained with ceiling mounted overhead pipe coils.

However, blower units are also successfully used for refrigerating frozen food storage rooms. However, care must be used in the design, installation and operation of these units to achieve the best storage conditions: first, the units must have sufficient coil surface to maintain the minimum temperature differential between coil and room (to provide high relative humidity); second, the total volume of air circulated by the units should not be excessive; and third, the air must be very evenly distributed throughout the room to avoid spots of high velocity.

The latter is accomplished by using several small units located evenly throughout the room, or by an air distribution duct system with the larger type of blower unit. In either case, the *discharge air* from the units or ducts *should be along exposed walls and ceilings and not directed against the stored merchandise.*

It has been attempted here to cover the major fundamentals of proper storage as they actually concern the rooms and operating conditions of the storage plant. The other important fundamentals involved concern the physical handling of the product; receiving into the warehouse, loading and unloading cars and trucks, in plant handling and stacking of the merchandise.

Receiving and Storage

One of the most critical of handling operations involves receiving of frozen merchandise at the warehouse dock. Regardless of whether the merchandise comes to the warehouse from refrigerated cars or trucks, or whether it comes directly from the processor's freezer, careful temperature checks should be maintained on all merchandise received for storage. Care must be taken before final storage of frozen foods to remove all heat gains that may have been incurred during transportation. Even if the product is received in an apparent frozen condition, the individual cartons or packages should be brought down to the storage room temperature before they are stacked away in a tight pile.

Within the warehouse, the merchandise must be stacked at least six inches from all walls, and upon pallets or floor racks on the floors to allow ample circulation. The refrigerated air should form an entire envelope around the product protecting it from the sources of heat infiltration into the room. Merchandise should not be stacked higher than eight inches below ceiling pipe coils, or 12 to 18 inches from the ceiling if air blower units are used.

Cars and trucks should be loaded

(Continued on page 51)

New South Wales Egg Marketing Board Operates Modern Egg Packing Plant

JOE J. BUDGE, MGR.
Jas. J. Budge, Pty., Ltd.
Sydney, Australia

THE Egg Marketing Board of New South Wales was inaugurated in 1928 in a modest way in the matter of premises, plant and quantity of eggs handled. With the passing of time however, the demand has increased enormously, not only in the quantity of eggs handled but in the various forms in which the eggs are distributed, such as eggs in shell, egg pulp and egg powder. So greatly has the demand increased, that the board has found it expedient to establish completely new premises. Besides centralizing the Board's operations in Sydney, it will obviate the necessity of storing eggs in widely dispersed areas with the attendant inconvenience and cost caused by such practices.

The successful preservation of eggs depends on the following factors: temperature, quality of eggs placed in storage, sterility of the egg content, preservation of micro-organisms on the shell, pH of the contents of the shell, and prevention of evaporation and prevention of absorption of flavors. All successful methods involve these factors to varying degrees, but in many instances, all conditions are not at optimum, and the true inter-relation of all factors to give the best storage conditions has probably never been determined.

Temperature Control

From a practical commercial viewpoint, all of the above factors can be and are controlled to a degree with the exception of temperature, which alone of all the factors enumerated can be controlled to within precise limits. That is the refrigeration engineer's job, with the aid of the requisite capital expenditure.

The Egg Marketing Board of New South Wales knows and understands, probably to an extent above any other authority in Australia, how important temperature control is, and one has only to look around the plant to realize just how important they consider it to be. The new center of operations is of modern design, equipped with the most modern methods of handling eggs and egg products under hygienic conditions. It is believed to be the largest single egg packing plant in the world.

Refrigerated Rooms

Adequate cold storage facilities are provided for both chilling and freezing purposes; these facilities and the plant providing the refrigeration

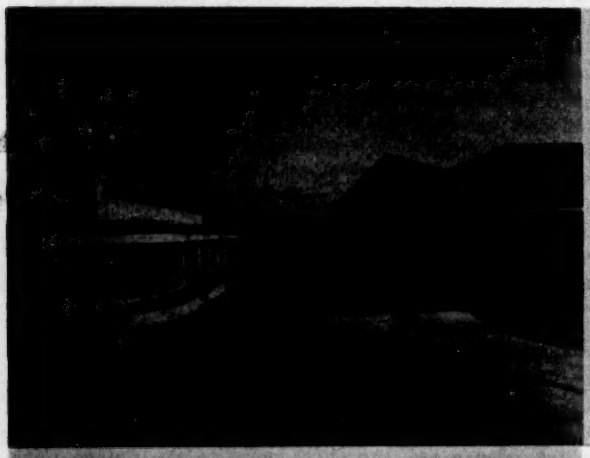

Fig. 1 (upper left)—Entrance to New South Wales Egg Marketing plant. Building on left is staff canteen and amenities block — Australian for personnel cafeteria, lockers, rest facilities, etc. On the right, administration building with packing shed behind.

Fig. 2 (upper right)—Engine building. Machinery level is 4 feet below roadway level. Condenser coils are housed in upper segment, with vent ports on far side. Oil traps, gas and liquid stop valves for condenser coils are located in upper louvred structure. Engine room roof is pan for atmospheric condensers.

Fig. 3 (lower left)—Egg troughs and shell elevator. Three units in background are Meade vacuum extractors for removing whites and yolks from shells.

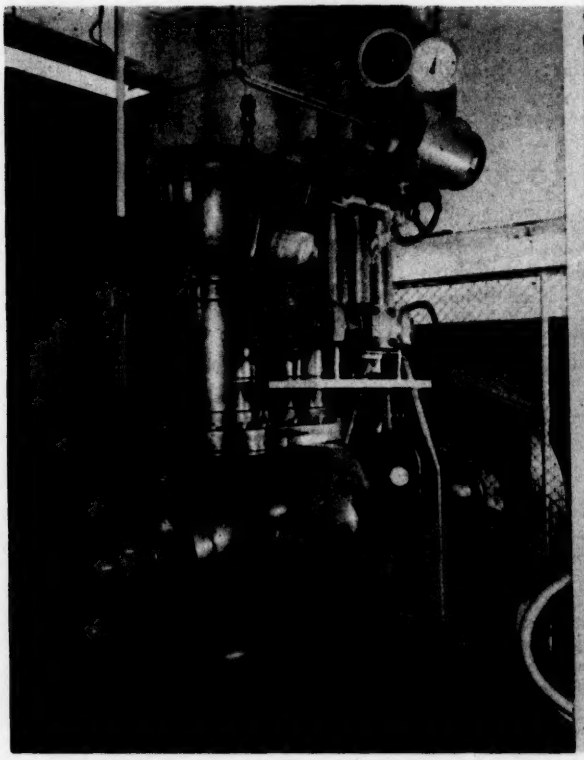

Fig. 4 — One of two 11½ x 11½ compressors serving this egg storage and freezing plant. Two more 8 x 8 and a 6½ x 6½ make up the compressor battery.

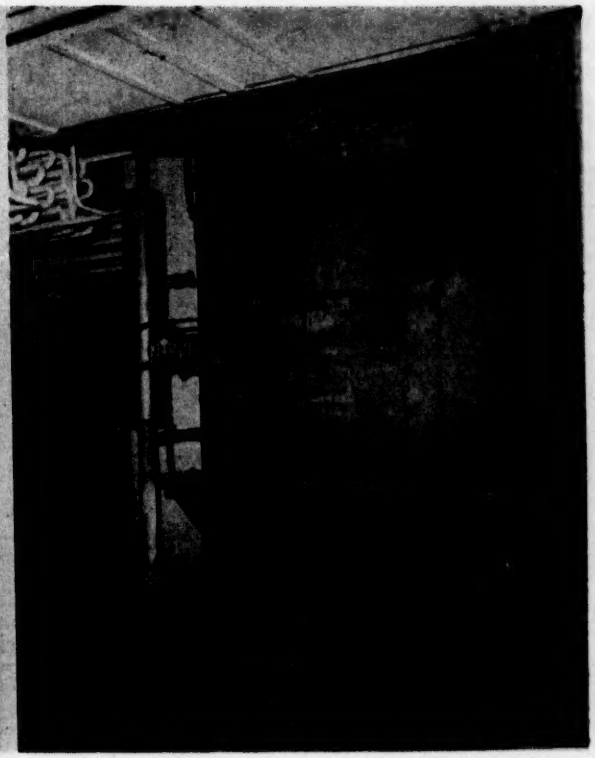

Fig. 5 — Budge brine sparged flooded type unit cooler installed in the coolers. This unit is in the dual purpose room. Coils at left are operated for freezing.

merits more than a passing word, and it is proposed, therefore, to deal with this aspect in some detail.

Three double freezing tunnels, each 32 x 20 x 7 ft. are provided for the rapid freezing of egg pulp. Each tunnel is capable of handling 864 28-lb. cans of pulp per day, so that with three tunnels operating, it is possible to freeze 2592 cans per day. The air flow in each of these tunnels is 48,000 cfm. at minus 10 F. The three evaporator coil banks in each tunnel are of 1¼ inch pipe coils with external common horizontal accumulators all insulated with 4-inch Onazote. Floors and ceilings are insulated with 12 inches of cellconcrete and the walls with 8 inches of corkboard. These tunnels have been well tested and found to handle up to 25 percent more than their rated capacity of pulp.

There are four chilling rooms; the dimensions of these rooms are approximately 70 x 27 x 12 ft. high. The floors and ceilings are insulated with 7 and 6 inches of cellconcrete respectively, and the walls with 4 inches of corkboard. The storage capacity of these rooms is 4500 cases of eggs per room. An air temperature of 32 — 34 F is maintained in all chillers by means of flooded type, wetted surface, unit coolers distributing air around the rooms by a system of ductwork.

Dual Purpose Room

Room No. 8 is of the dual purpose type, being designed and equipped for use as either a chiller or freezer. This room is 76 x 55 x 12 ft. high and is insulated on floor and ceiling by 9 inch cellconcrete and all walls with 6 inches of corkboard. The purpose of the room is for either storage of eggs in shell or long term storage of egg pulp. The capacity of this room is 9,000 cases of eggs or 40,000 28-lb cans of egg pulp.

An air temperature of 32 — 34 F, as in the case of the other rooms, is maintained when this room is used as a chiller. When used as a freezer, an air temperature of 10 F is maintained. The room is equipped with two flooded type wetted surface unit coolers and also ceiling coils; the latter for use when it is desired to use this room as a freezer.

Room No. 7 is intended for frozen storage only. The dimensions and insulation are the same as in the case of room No. 8. This room is designed to operate at 10 F and is equipped with ceiling coils only.

The engine room plant comprises five twin cylinder vertical enclosed type ammonia compressors, supplied and installed by James Budge Pty. Ltd. There are two 11½ x 11½ compressors, two 8 x 8 and one 6½ x 6½ compressor. Provision has been made in the engine room for the installation of an additional 11½ x 11½ and a 6½ x 6½ compressor. With the addition of the two compressors, the plant will then have an installed nominal compressor capacity of approximately 336 tons.

Engine Room Roof Used as Atmospheric Condenser Sump

The engine room and condensing section of the plant is so designed that the ceiling of the engine room forms the bottom of the sump for the condenser. This arrangement serves the multiple purpose of saving space, reducing building construction costs and concentrating all engine room plant and associated equipment under one roof, yet without any evidence of overcrowding.

The condenser itself is of the atmospheric type, consisting of 44 banks of interlaced coils, each 40 high and 17 feet long. For the present and forseeable future, it would appear that the condenser capacity is of such generous proportions as to be adequate to meet all demands likely to be encountered.

The four condenser circulating

water pumps are located on what may be described as a mezzanine floor at one end of the building. The pumps, each of which is provided with isolating valves, discharge into a common header, from which is taken the main water supply to the condenser sprays. Also from the main headers are taken a 2-inch auxiliary supply header which traverses the full length of the engine room. From this, branches radiate to the several compressors for jacket cooling purposes.

The liquid and suction lines to and from the various refrigerated areas, pass through an underground tunnel rather than adopting the more usual practice of conveying such pipes by means of a gantry or similar method. By taking the lines underground, they are completely protected against accidental damage and from the possible serious consequences arising from such an accident.

Dual Suction Arrangement

Though the compressors are not of the multiple effect type, two suction lines are brought back to the engine room. To one of these is connected the returns from all chilling and freezing rooms, and to the other is connected the returns from the blast freezers. Thus, it will be seen that the blast freezers can be operated quite independently of the chilling and freezing rooms, though not simultaneously by the same compressor.

The layout of the main suction lines in the engine room also allows for a complete cross-over of compressors, so that any one or number of compressors can be connected to any class of work separately; i.e., chilling, frozen storage, or blast tunnel freezing. Provided also is a comprehensive installation of electrical distance indicating and recording thermometers grouped on a special panel in the engine room.

Valves

Solenoid valves are provided on both the suction and liquid lines and are thermostatically controlled, enabling an individual room to be pumped out without in any way interfering with the operation of adjacent rooms. As another instance of flexibility, it may be mentioned that all automatic NH_3 controls are provided with a bypass arrangement whereby the function of an automatic device can be controlled manually in the event of it being desirable, or in cases of emergency or overhaul. The insulation of suction lines was in sectional Onazote, sheet metal covered and painted.

The electrical work, in itself a major undertaking, was carried out by J. W. Bartholomew & Sons Pty. Ltd. The whole project was engineered and supervised by S. W. Dunkerley, consulting engineer, Melbourne, who has been associated with the Egg Board in all its refrigeration projects.

Sanitary Regulations For Handling Ice

A SET of sanitary regulations for handling ice has been prepared by the North Carolina Ice Association. There is no official sanitary regulation in North Carolina covering the handling of ice but, says L. H. Powell, secretary of the association, when the State Board of Health began receiving complaints from various parts of the state, the ice men decided to draw up these voluntary regulations:

1. The entire manufacturing, storage and sales area shall be kept clean and free from debris at all times.
2. No employer shall knowingly permit a person in or around the ice plant with infectious or contagious disease.
3. Toilets shall be kept clean at all times and every employee required to wash his hands with a medicated soap or disinfectant after such usage.
4. Smoking, or use of tobacco in any form shall not be permitted in tank, processing or storage rooms.
5. All ice will be made from city water or a supply approved by the State Board of Health.
6. All ice shall be agitated to form a clear block and all cores sucked and refilled with clean water if the ice is intended for use in food products (except where de-mineralizing or other similar function equipment eliminates necessity for same.)
7. All persons, except employees whose duties so require, shall be kept off freezing tank tops. Exployees whose services are required upon tank shall wear clean shoes, rubber over-shoes, or boots.
8. All cans shall be allowed to drip over the can opening before it is carried over the tank top.
9. Tank tops shall be kept clean and in good repair at all times.
10. Drop tubes shall not be laid on the tank top but shall be hung along the side, stored in a cabinet or in a castor mounted box for movement across the tank top.
11. Core suckers, core refillers, and thawing needles shall be hung along side of the tank when not in use and kept free from the tank top.
12. All dip tanks shall be fitted with a slot or partition type overflow at such height that the cans will not be submerged. All such overflows shall be of a permanent type.
13. Air intake to the blower should be elevated several feet from floor or equipped with an air filter or small mesh safety unless taken from underneath the tank top.
14. Where ice is to become a part of a food product, ice crushers and sizers shall be protected in a practical way from dirt and dust.
15. All ice to be used in food products shall be handled with tongs, sanitary bags, and shall not be handled by the hands of the employees.
16. Prepared ice in non-returnable sanitary containers is to be provided at the platform for customers requesting such service.
17. Loading platforms and docks shall be washed as often as necessary to keep them in a sanitary condition.
18. All crushed, sized and cubed ice when sold and delivered for use in a food product shall be delivered in clean sanitary containers and kept covered while in transit.
19. All truck bodies should be kept in a clean sanitary condition, washed daily or as often as necessary to keep them clean.
20. Where canvas covers are used that come in direct contact with the ice, they shall be kept as clean and sanitary as possible.
21. All returned ice by drivers shall be thoroughly washed before offered for resale.

Ice Making Discontinued Ice Cream Substituted

THE NORWOOD Ice Company, Northampton, Mass., established in 1844, has discontinued the manufacture and storage of ice. The concern is buying ice wholesale in Holyoke for delivery to about 200 accounts. Two years ago about a third of the ice making plant was discontinued and the equipment sold. To make up for the declining ice business, an ice cream plant has been installed which is now bigger than the ice business was at its peak.

Missouri Ice Display

THE MISSOURI Valley Ice Manufacturers Association joined with the Missouri Improvement Association, the Missouri Valley Turkey Growers Federation, the Missouri Poultry Council and the Extension Service of the University of Missouri in sponsoring an iced poultry display at the Missouri State Fair at Sedalia, August 21 through August 29. This display was in the Educational Building. The Association also cooperated with the Vegetable Growers Association of Missouri and furnished them with ice vegetable display cases for their booth in the Agricultural Building.

Edgewater Beach Hotel Extends Air Conditioning

A CENTRIFUGAL refrigerating machine of 265 tons capacity has been installed in the Edgewater Beach Hotel, Chicago. It serves an all-season air conditioning system for the hotel's grand ballroom, Michigan room, and several smaller dining rooms. In the immediate future, 200 guest rooms will be added to the system. Prior to this installation, only the Marine Dining Room and some small private dining rooms were air conditioned with small self-contained units.

The water chilling unit is Carrier's rated at 640 gpm from 55 to 45 F with 300 gpm condensing water at 70 F. City water is used in the condensers and is regulated automatically. A 250 hp, 1800 rpm, 220-volt 3 ph 60 cycle wound rotor motor drives the centrifugal through conventional gears. Motor control is variable, with tie-in to a manually operated suction damper for economical operation at partial load conditions.

A central system was chosen over earlier proposals for unit type equipment, according to Samuel R. Lewis & Associates, consulting mechanical engineers for the hotel. Reasons for the choice were given as dependability, long life and low operational and maintenance costs; flexibility to meet a largely varying loads in public rooms; quietness of operation within guest rooms; and elimination of drain and condenser water piping from public spaces.

Conditioned air ducts to public rooms, and for guest rooms soon to be done, are all concealed. Design conditions specified by the consultants were: winter operation based on outside dry bulb at 10 F, inside temperature at 70 F; for summer; inside temperature of 80 F and 50 percent relative humidity, with outdoor temperature of 95 F dry and 75 F wet bulb.

Heating and Ventilating Meeting and Exposition

THE attendance record set in 1953 is expected to be surpassed when 30,000 members of the American Society of Heating and Ventilating Engineers gather in Philadelphia January 24-27, 1955 for the 61st annual meeting. There will be a complete program of technical sessions at which papers describing the latest research and developments in heating, air conditioning, ventilating and cooling will be presented.

The Committee on Arrangements of the Philadelphia Chapter, headed by John W. McElgin, general chairman and John Everetts, Jr., vice chairman, announce that registration headquarters will be at the Bellevue-Stratford Hotel; the Benjamin Franklin, Warwick, John Bartram, Sylvania and other hotels have committed all available hotel rooms to accommodate the record influx.

The 12th International Heating, Ventilating and Air Conditioning Exposition to be held in conjunction, will open at 2:00 p.m. on Monday, January 24 for a period of five days through Friday, January 28, at the Commercial Museum with nearly 400 exhibitors taking part.

New Canadian Cold Storage

THE EMPIRE Cold Storage Company Ltd., Montreal, Canada announces that work has started on a million dollar public cold storage plant which will be one of the largest and most modern in Canada, utilizing all the latest and most modern cold storage equipment and machinery. It is expected that this new plant will be completed and in operation on or about May 1, 1955.

Prevent

COLD ROOM LOSS

with . . .

AIR-LEC DOOR OPERATORS

Air-Lec, shown installed above the cooler door, opens and closes the heaviest doors quickly, safely and smoothly at the touch of a switch or the light pull of a cord. Available with Mechanical Trip for one or two operating stations above each door approach, or with Electrical Switch for more and distant stations. Air-Lecs are in use in thousands of factories, food freezing and storage plants, meat packing companies, garages and service stations. Speed and Safety are characteristic of Air-Lec because Air-Inertia-Spring, all elastic forces, are the patented forces used.

AIR-LEC FOR TYPICAL COOLER DOOR. . **$65.00**

. . . AND AIR SEAL

Installed at left of door in illustration, the Air Seal operates in conjunction with Air-Lec, to provide an absolute seal on cooler doors. Air Seal crowds the outer edge of the door to stop improper circulation and frosting. Air Seal is especially desirable where temperatures below freezing are maintained.

AIR-SEAL. $25.00

NOTE HOW THEY RE-ORDERED AIR-LECS

	Recently Ordered	Now Enjoy
Arizona Cold Storage, Inc. Phoenix, Arizona	3	6
Michigan Fruit Canners, Inc. Fennville, Michigan	1	15
Gaudio Bros., Inc. Camden, N.J.	1	6
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Fill in and return the coupon today for complete information.

SCHOELKOPF MFG. CO., Madison. Wis.

Cooler Doors are ___ Ft. Wide, ___ Ft. High. Air Pressure ___

Open Toward Warm Side, Cold Side.

Firm Name _____

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By _____ _____

SCHOELKOPF MANUFACTURING CO.

312 N. THIRD ST., MADISON 4, WIS.

Modern Food Freezing Plant Built To Meet Future Needs

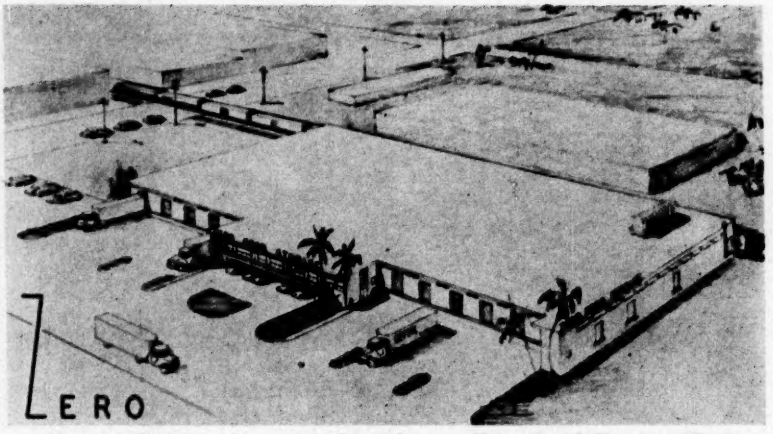
THE Zero Food Freezer Plant now under construction at 7007 N. W. 37th Avenue, Miami, Fla. as designed by M. Tony Sherman Associates, arcnitects and engineers, has several "firsts" to its credit and is being watched by people interested in freezer and cold storage construction and operation all over the country.

A comparatively new enterprise in the national economy, plants for the freezing and storing of foods, present a number of problems not heretofore encountered in construction and such a plant, located in our subtropical climate offers some specialized problems in addition. For example, among the several investigations made prior to the design of the building, the architects found that the temperature of the water six feet below the surface was eighty-eight degrees. Thus, in addition to "normal" freezer plant problem, the designers were confronted with the problem of moisture control and "refrigeration loss" through the ground, in order to maintain the required temperatures in the areas above and to avoid floor upheaval that might be occasioned by the low temperature requirements. This was solved by the inclusion of a specialized earth fill with a moisture vapor barrier, a method devised by the designing firm.

The Zero plant will also boast the first aluminum roof deck to be used in the South. This decking, by Reynolds Aluminum Company, was selected because it is corrosion-proof, maintenance-free, light-weight and affords superior insulation qualities. In fact, it is the same type of insulation that is used in home freezers for top efficiency. The decking will be fastened in place by the use of aluminum end arc-welded studs, a stud fastening method invented by W. J. Kane, now of Miami, for the Nelson Stud Welding Company. This method was used in the construction of the Hydrogen Bomb Project in Aiken, S. C.

Construction Features

There are several especially interesting features concerning the construction design. In view of the fact that the plant is being erected in the hottest part of the year and since, when the plant is placed into operation, sub-freezing temperatures will be introduced, the steel has been designed for contraction, rather than the usual expansion. Calculations showed that the steel would contract approximately two inches in the length of the building, if designed in the usual fashion. Insulated areas are completely independent of the rest of the structure, in consideration of the temperature problems. The footings of these areas use light-weight aggregate thermal-resisting concrete, so that the thermal resistance of footings and piers are equal or better than the insulation floor of the dry fill.



Architects drawing front exterior of new Zero Food Freezer Plant at Miami, Fla.

The framing of the insulated area is of double cantilever construction, resulting in substantial economies. More importantly, it allows the contraction to be isolated within the areas of cantilever, instead of all-over contraction for the whole room. Connections between the simple beams connecting the cantilever, have open joints with slotted holes to permit localization of the expected contraction.

Walls and ceilings of the refrigerated areas are to be built of Owens — Corning Fiberglas, in thicknesses of eight inches for the walls and ten inches for the ceiling, as an insulation against the Florida sun. The ceiling insulation will be augmented by a roof covering of white marble chips which will also serve to reflect the rays of the sun.

The Carrier Corporation of Chicago is arranging to install the air-conditioning and refrigeration equipment and will use its newly developed automatic control system which permits "push-button" operation with all necessary controls built in. Their engineers spent three days in Miami in the offices of Tony Sherman Associates studying the problems involved and co-ordinating their design for maximum efficiency.

Freezer Plant

The zero freezer plant which will measure 233 feet by 330 feet, will include two cooler rooms for the storage of raw fruits and vegetables, an enormous freezer room for the storage of processed meat, fish and vegetables, a blast room with a temperature of minus 35F for the quick-freezing of foods and a processing room for the preparation of foods before freezing. Each area will have and maintain the temperature best suited to its function.

An important innovation incorporated in the plant is the inclusion of an "Air-Lock". This represents an enclosed corridor which completely encircles the main functioning areas of the plant. Rolling doors, regularly spaced on the outer wall of the air-lock are sized to fit the loading span of a refrigerated truck or a refrigerated railroad car, so that a seal is formed during the transfer of foods into or out of the refrigerated areas. Also, in the event of rain, operations may continue under complete and safe coverage. Five refrigerated railway cars and eleven refrigerated trucks may be serviced simultaneously.

In the air-lock area, electrically operated fork lift trucks will be stationed to handle merchandise on pallets, thus reducing handling time and cost. As a further service, automatic battery chargers will be installed in the air-lock area, so that fork-lift trucks may be plugged in at night and automatically recharged for operation by the following morning.

In this area also, cage offices for the brokers are provided, for the checking of operations, as well as locker and washroom facilities for plant employees and for truckers. Provision has been made too for a canteen which will contain automatic vending machines to dispense coffee, sandwiches, cold drinks and similar refreshment.

On the inner "wall" of the air-lock, super-freezer doors of a size coordinated with the outer rolling doors, will be installed with automatic openers. To further seal these openings, "door-sills" have been especially designed, so that there is no leakage of refrigeration or of warm air from the outside.

Mezzanine Floor

A mezzanine floor will provide individual offices for the food brokers who lease space in the plant. These offices will have separate access to the exterior and to the plant, and glass walls in both directions will enable the brokers to oversee the operation of loading, unloading or stacking of their products. These offices will have their own air-conditioning systems and executive car parking is provided, directly underneath.

In line with the theory that an industrial structure need not be cold and forbidding, but should rather be an asset to its environment and an attractive place in which to work, the building will be colorfully painted with gay tones for the rolling doors and planting areas have been incorporated in the exterior design.

Arthur Schlossman, an officer of the owner corporation feels that the operation of the building should be a great stimulus to the agricultural interests of southeast Florida, since it offers the grower convenient facilities for the utilization of his produce long after the harvesting season. He need no longer be concerned about over-production and the possible depression of prices in the heavy harvesting weeks, for the Zero plant will offer him a simple means of extending his selling period, through the services they offer. Also, sales need not be confined to satisfy local demand, but may be spread throughout the country when the produce is properly processed for storage and distribution.

The Zero Plant is being erected by Zero Food Stores, Inc. of Chicago, operating similar plants in Rochester, N. Y., Chicago and Paducah, Ky., where they service a number of nationally advertised frozen food and meat accounts. They expect that the Miami plant will be their most active, because of the superior facilities offered and they have already arranged for the purchase of additional land, so that they may be able to increase their facilities as soon as the need arises.

Spector and Sons are the contractors for the building. The cost of the building, with equipment, will run close to one million dollars. Completion has been set for November 5.

Canadian Truckers Seek to Increase Refrigerated Produce Traffic

THE 63,400 freight carloads of fresh fruits and vegetables unloaded at principal Canadian markets, in 1952, by rail and boat is regarded as "potential business" by the trucking industry, G. M. Parko, president of the Canadian Trucking Associations, stated.

In an address prepared for delivery to the annual convention of the Canadian Fruit Wholesalers' Association, he said: "I have no hesitation in saying that the trucking industry hopes to make its refrigerated services sufficiently attractive to add to its present volume of fresh fruit and vegetable traffic. The refrigerated van, one of the newest members of the trucking family, makes it possible to move perishable products in a relatively short time and have them at the point of consumption as fresh as the day they were taken from the ground. From the competition of the several forms of transport, and the advantages preferred by each, you, the consumers of refrigerated transportation services, will benefit."

Some Use Ice

Below-zero temperatures can be maintained in mechanically refrigerated truck-trailer vans, Mr. Parke stated. As an alternative to mechanical refrigeration, many vans are equipped with ice bunkers with a capacity of 1,000 to 1,500 pounds of ice. Cold air is circulated by a fan in the nose of the van. The vans are re-iced in transit at regularly placed icing stations. Vans of both types—mechanically refrigerated or with ice bunkers—are provided with from three to six inches of insulation to maintain the temperatures created.

Mr. Parke stated that the Florida State Marketing Bureau had reported that in 1951-52, 17.5 percent of their citrus fruit shipped to Canada were transported by truck. Formerly, all of this traffic went by rail. Many long-haul interprovincial trucking companies, including those operating from Quebec and Ontario to the four western provinces, provide refrigerated service for perishable traffic.

He stated that in a postwar competitive survey made by the Association of American Railroads, 78 percent of shippers queried had given faster service as their reason for preferring trucks for inbound merchandise traffic. Again, faster service was given by 73 percent of the shippers as their reason for preferring trucks for their outbound merchandise traffic. He said "Refrigerated truck service is tailormade to the specific requirements of each shipper and the conditions which face him. The shipper who requires refrigerated service and who moves his produce by truck can estimate the degree of refrigeration required, based on his calculation as to speedier delivery and the nature and perishability of the goods transported. The correct temperature is individually controlled for each load by the driver."

Kroger Warehouse To Install Refrigeration

AIR CONDITIONING and refrigeration will be employed to a high degree in the new $3,000,000 Kroger warehouse and office building now under construction at Toledo, Ohio according to Carl Fuller, Kroger Toledo branch manager. The project is scheduled for completion in the fall of 1955.

The one story warehouse will have 166,000 square feet of floor space. Several different types of storage rooms will be built. Included will be below-zero freezers for frozen foods; "wet" and "dry" refrigerated rooms for fresh fruits and vegetables, and special banana ripening rooms.

The modern office with 12,000 square feet of floor space will be air conditioned.

Annual Ice Convention—November 9-12 Netherlands Plaza Hotel Cincinnati

AGAIN the Netherland Plaza Hotel, Cincinnati, Ohio, one of the country's finest hotels, will welcome ice men to the 1954 National Ice Convention, November 9-12, 1954. Because of its bustling hospitality, its elegant facilities and its superb location, the 1952 convention at this site was a great success. By popular acclaim to return to Cincinnati, and soon, it was decided to go there in 1954.

It is expected that this 37th national convention will reach an all-time high in attendance and interest. Cincinnati is within over night distance of more people than any other metropolis in the country. It is served by eight major railroads and by four airlines. Easy access by automobile is made possible by a network of arterial highways.

The Program

An interesting, down-to-earth, informative program is assured, according to reports from the National office. There will be two sessions devoted to something entirely different, a new type of program. "How We Do It." Here ice men who have been outstandingly successful in some new money-making or money-saving activity will relate in A, B, C manner how they did it. Then those present will have an opportunity to quiz these people who have the know-how. As usual leading ice men will analyze the status of the business and comment on the future outlook. In addition there will be a slate of the country's most prominent guest speakers.

Entertainment

For entertainment, there will be the usual gala dinner dance and floor show, and there will be many additional planned events, particularly for the ladies. On top of all this, there are many places to visit in Cincinnati. There's Eden Park with its lofty views of the river and neighboring Kentucky; the Art Museum and the breath-taking inclined railway, Rookwood Pottery, the Taft Museum a few blocks from the Hotel; the Cincinnati Zoo; the $41,000,000 Union Terminal; and the River Front harbor. A few miles up the River is Coney Island amusement park, fun headquarters for all of southwestern Ohio. An ususual feature of the Cincinnati Museum of National History is the Industrial Museum, stocked with scale models of early machinery.

But there's plenty of more sophisticated entertainment in Cincinnati too; night clubs, theatres, and smart dining spots. Many are in the compact downtown area; many others are across the Ohio River in the northern Kentucky suburbs.

Canadian Ice Convention

THE annual convention of the Canadian Association of Ice Industries will be held at the Sheraton-Brock Hotel, Niagara Falls, Ontario, November 2 and 3, 1954. After an absence of three years, the convention site is again in Southern Ontario and the greatest turnout in the Canadian ice industry's history is expected. The convention committee has been working for some months lining up what promises to be the most practical program ever presented at a Canadian convention.

Portland Store Uses Snow Ice to Sell Overcoats in July

WHEN Weiners, one of the popular men's furnishings stores in Portland, Ore. scheduled an overcoat sale in July, a novel publicity stunt was put on with snow ice piled high on the sidewalk in front of the store.

A total of 848 bushels, over 20 tons, of ice was used, furnished by the Liberty Ice & Fuel Company. The ice was delivered on the sidewalk in front of the store shortly before 8:00 a.m. Monday, July 26, on one of the busy downtown Portland streets. It made a very interest-catching display. Although this was one of the hottest summer days in Portland (80 F) there was not a great deal of ice meltage, as shown by the photograph which was taken that afternoon at 1:30.

Mr. Weiner, the owner, was very happy to report that this novel publicity stunt of twenty tons of ice on the sidewalk put across the overcoat sale fully up to their expectations.

Street scene in Portland in front of Weiners store. Note snow ice piled on sidewalk.

Southwestern School For Ice Plant Engineers

A SCHOOL for plant engineers will be held by the Southwestern Ice Manufacturers' Association at the Texas A & M College beginning Sunday, January 23, 1955 and continuing for a week. College facilities will be available, including class rooms and laboratories, sleeping accommodations in a college dormitory, and privileges of the student cafeteria. The costs of food and lodging will be at the lowest possible minimum and should not exceed $5.00 a day.

Preparation of materials and texts, and expenses incidental to the organization of the instructional staff, the costs of texts and other materials supplied to each student, will entail costs of approximately $25.00 per student. Hence, the registration fee is set for this school, as it was for those held in 1949 and 1950, at $25.-00 per student.

Each subject will be presented by an outstanding engineer, these subjects to include the following:

List of Subjects

Fundamentals of Refrigeration

Water Treatment for Ice Manufacture

Efficient Operation of Ice Manufacturing Plants

The Efficient Use of Power in Ice Plant Operation

Efficient Operation of Condensers and Receivers

The Efficient Operation of Cooling Towers

The Efficient use of Ammonia in Ice Plant Operation

Accident Prevention During Plant Maintenance and While Operating Ice Making Equipment.

Treating Water for the Manufacture of Ice

Automatic and Semi-Automatic Controls

Good Housekeeping in Ice Manufacturing Plants and Sanitation

Purposes of Fundamental Pieces of Equipment in Ice Manufacturing Plants, in five parts: (1) Introduction and ammonia compressors. (2) Ice tank and equipment (3) Expansion valves. (4) Ammonia condensers. (5) Pumps.

If sufficient interest is shown, elective courses will be offered on cold storage and locker plant operation, and dairy refrigeration.

The Association requests the cooperation of Texas ice men in working out arrangements for this important function in businesslike fashion. Assurance from members that at least fifty students will attend is needed to make commitments for the expenditures involved, and the preliminary work.

City Products Report

SATISFACTORY operations, with higher earnings despite slightly lower sales for the first half of 1954 were reported by Wm. J. Sinek, president of City Products Corporation, Chicago, Ill. Net income amounted to $1,408,469, equal to $1.12 a share, compared with $1,363, 236, or $1.08 in the first six months of 1953.

New Icing Facilities

THE UNION Pacific and Southern Pacific Railroads will start operation at Ogden, Utah, of $4,000,-000 worth of new speedway yard facilities. The improvements have national significance for transportation of perishables, since the Pacific Fruit Express Co., jointly owned by the two railroads, has converted to mechanical icing, increased icing-platform facilities by 220 refrigerator cars and expanded ice manufacture and storage facilities.

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Railroads Increase Frozen Foods Traffic With Mechanically Cooled Cars

RAILROADS are trying to win a bigger part of the fast-growing frozen food industry's traffic by putting into service mechanically refrigerated cars, according to a staff writer in The Wall Street Journal. Refrigerated Trucks now haul slightly more than half of all frozen food.

Even though railroads get the small slice, the $25 million they obtained from this profitable traffic last year was six percent of all revenue collected for hauling perishable foods. In 1947 only 2.5 percent of perishable revenues came from frozen foods.

This developing battle for traffic should improve the quality of the strawberries, fish, peas, poultry and the many other frozen products that now make up such an important part of the American diet. Frozen food must be kept at zero or below to insure top quality, says L. S. Martin, secretary-manager of the National Association of Frozen Food Packers.

Growth in Five Years

Here are a few figures that indicate how swiftly railroads are rolling into mechanical refrigeration. The first mechanical "reefers," or refrigerator cars, went into service a little over five years ago. One of the pioneers in the development of these cars, the Santa Fe Railway, now has 30 of them and plans to order 100 more.

Pacific Fruit Express Co., a refrigerator car subsidiary of Union Pacific and Southern Pacific railroads, will begin construction of 200 in September. Also in September 50 cars will be started for Northern Pacific. Western Fruit Express Co., a car company owned by 19 Eastern and Southeastern railroads, recently ordered 100, and has 45 coming on a current order.

There are 553 reefer cars now in service. And, declares John Rill, president of Fruit Growers Express Co., Washington, D. C.: "There'll be a greater trend to these rolling freezers. It's too early to predict that all cars will be converted to mechanical refrigeration, but the possibilities are enormous." F.G.E., with 216, is now the largest user of mechanical reefers.

Boosters of the mechanical reefer say one of its advantages is lower operating costs. Moving a carload of frozen strawberries from California to Chicago takes about 14 tons of ice, when conventional refrigerator cars are used. At $6 a ton, that's $84. Add to that four tons of salt at $20 a ton or $80 and the cost comes to $164.

The diesel fuel, lubricating oil refrigerant and running repairs for a mechanical reefer would cost about $75. This doesn't include major maintenance or depreciation charges. Rail men say they haven't had sufficient experience with refrigerating systems to estimate these expenses. There's nearly 50 percent more space for payload in the mechanical reefers. That's because the newer reefers are about 10 feet longer than conventional cars the equipment doesn't require as much space as ice.

Mechanical cars can spend more of their time working, which helps reduce costs. Before reefers are loaded, they have to be pre-cooled. A mechanical car requires only six to 8 hours to cool; ice cars take 24 to 36. Eventually, if solid trains of mechanical reefers could be run, only a few brief stops would be necessary for inspection and setting out of cars. That would make for faster schedules. Between California and Chicago cars of frozen foods must be iced six to seven times.

Original Cost

The rub with mechanical reefers is their original cost. That's why railroaders haven't been as quick to convert. One of those giant, 70-ton cars built with conventional ice bunkers costs upwards of $13,000. Install instead a mechanical refrigerating system costing about $9,000 and almost 70 percent is added to the investment. Or put a mechanical unit in a car already owned, and $9,000 is laid out for the freezing unit, plus $1,000 to $2,000 for installation and remodeling expense.

That's a lot of money for equipment that's idle a good part of the time. Actually, reefers make only about 13 trips a year under load, and only seven of these require refrigeration. Five of them are made with lettuce, potatoes, oranges and other perishables that need only ventilation to prevent spoilage; one trip requires heat in cold weather. Reefers spend the rest of their time moving empty or standing in yards and sidings.

The reefers make only about 13 trips a year under loan because perishable traffic is almost entirely one-way. Cars carrying perishable goods from California to an Eastern point seldom have perishable goods waiting at the Eastern point to be shipped back to California.

And, observes Mr. Rill of Fruit Growers Express, there's another thing to be considered in determining the economics of mechanical refrigeration—that's the millions of dollars railroads have invested in icing facilities.

Because of their big investment in the freezing systems, railroaders insist they'll have to continue to get top charges for this new service. For hauling perishables in mechanical reefers, the carriers currently collect the highest rate asked for shipments using maximum amounts of ice and salt in conventional cars. And, they add, not even this rate is adequate. They're trying to get the Interstate Commerce Commission to raise their charges for handling perishables about 30 percent to cover higher ice, labor and other costs.

Lower Cost Units

Makers of mechanical equipment for reefers are trying to develop lower cost refrigeration units. Cut the cost by two-thirds, says Al Dewhirst, manager of Santa Fe's refrigerator department, and it would be economical to haul perishables as well as frozen foods in mechanical reefers. "You'd see a conversion to mechanical systems by the railroads as speedy as their dieselization of power," he declares.

Four companies are principal suppliers of fruit car refrigerating equipment — Trane Co.; Frigidaire Division of General Motors Corp.; Carrier Corp.; and U. S. Thermo Control Co.

Mechanical Elements

The mechanical elements of their systems are essentially the same: A diesel engine driving a generator, a compressor, a condenser, cooling coils, blower fans and necessary controls. A cost-saving variation in U. S. Thermo Control is the elimination of the generator. Originally the company's engines used gasoline for fuel, but a number are being converted to diesel fuel. Housed in a compartment across the end of the car, refrigerating systems take the same space — about four feet — as one ice bunker. Fuel Tankers, carrying a 14 to 17 day supply of diesel oil (300 to 400 gallons) are underneath the car.

The nearly 1,200 mechanical reefers in use and on order represent a big step forward, although complete mechanization may still be some way off. The total refrigerator fleet

(Continued on page 51)

Practical Refrigerating Engineer

NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS

Air Conditioning an Occupied Hotel

J. K. BLANCHARD
Carrier Corp.
Philadelphia, Pa.

AIR CONDITIONING of an occupied hotel is a problem that requires a great deal more planning than new construction. The loss in revenue must not only be kept at an absolute minimum, but the space to be occupied by the distribution system as well. This is particularly true if the type of system to be used, is to replace the old heating plant.

The Warwick in Philadelphia, a Kirkeby Hotel, has solved its problem by installing the system in a number of steps. Carrier Corporation was commissioned to design and install this system, which was done in the following manner:

The first step was to provide conditioning for the public spaces. The lobby, public and private dining rooms, the ball room and hotel offices were each provided with a central station apparatus of conventional design. A Carrier centrifugal refrigeration unit chills the water which is circulated to the various apparatus rooms.

Extra refrigeration capacity was included for the second step, which was the conditioning of a block of 90 bedrooms located in the architectural setback at the front of the hotel. These were the first hotel rooms to be air-conditioned in Philadelphia. As the demand for these rooms far exceeded the supply, the third step quickly followed. This was the conditioning of the entire north wing which contained 196 bedrooms.

Central System Used

The fourth step is now being started. This involves conditioning of

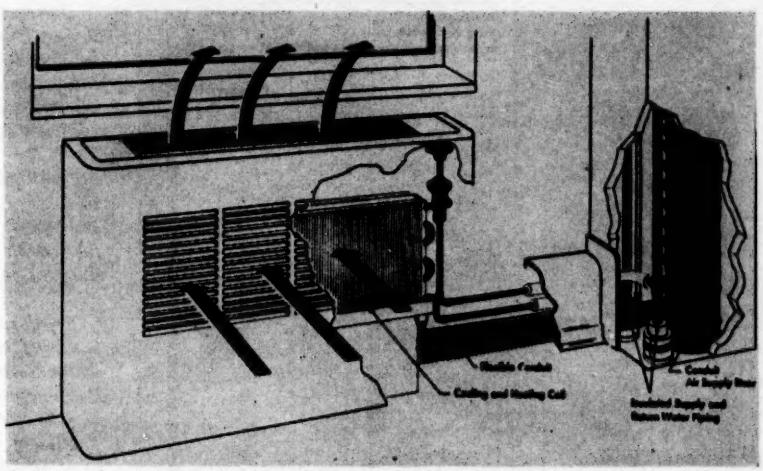

Fig. 1 — Conditioned primary air and chilled water are supplied to the guest room Weathermaster unit from a central plant through small high-velocity air conduit and water pipes concealed within a wall column. Since both the air and water cycle operate independently of each other, it is possible to control humidity as well as room temperature and thus create ideal climate at all times. Ventilation is positive and air circulation is always constant. Warm water replaces chilled water in the circuit for winter operations. — Copyrighted; Reproduced by Permission of Carrier Corporation.

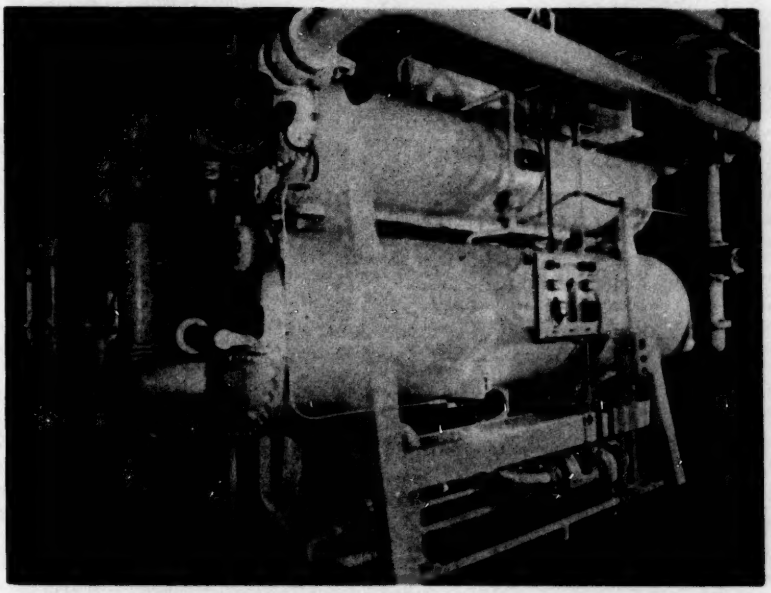

Fig. 2 — NAPRE members may observe an absorption plant similar to the Warwick's during the 45th Convention, November 2-4. Three units above are installed at Krauss Department Store, New Orleans.

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Operating engineers of all refrigerating plants are invited to affiliate with the National Association of Practical Refrigerating Engineers, an educational association.

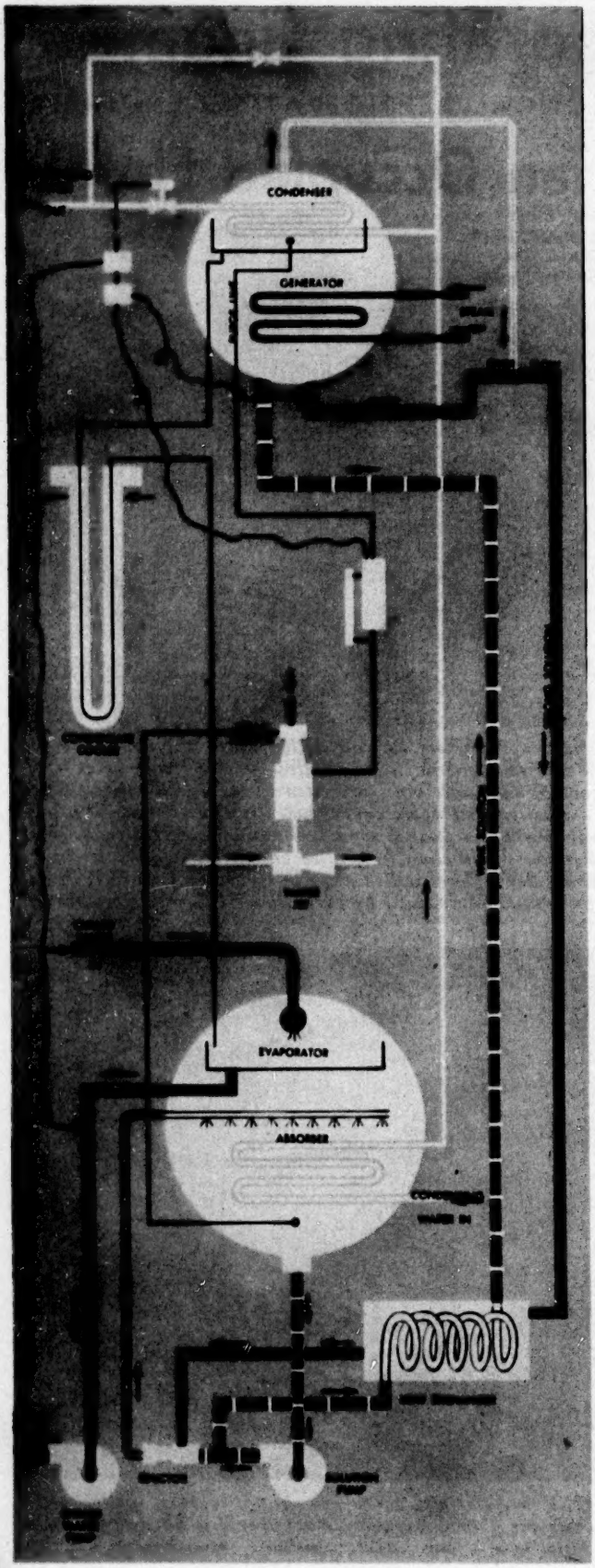

Fig. 3 — Diagrammed at the left is an absorption refrigerating machine designed especially for large scale water cooling as required for air conditioning and various industrial processes. Although the absorption refrigeration principle is not new, its use for large commercial and industrial applications had been greatly limited prior to 1945 because of the lack of a refrigerant-absorbent which was both safe and efficient. The Carrier absorption machine pictured here uses water as the refrigerant and lithium bromide solution as the absorbent. Its cycle of operation is as follows:

Generator: The upper shell contains the generator and condenser, with generator tubes located in the lower portion. Steam admitted into the tubes heats the solution around the tubes and boils off the water vapor which was absorbed; thus the solution concentration is restored.

Condenser: The water vapor boiling from the solution is condensed by the condensing water in the tubes. This condensed water vapor then is returned to the evaporator tank by way of a condensate cooler.

Evaporator: The lower shell of the machine contains the evaporator and absorber. As chilled water returns to the machine, it is sprayed into the evaporator. Since a low absolute pressure is maintained in the shell, some of the chilled water flashes or vaporizes and cools the remaining water to a temperature which corresponds to the shell pressure.

Absorber: The bottom portion of the lower shell contains the absorber tubes. Here a concentrated solution (strong in salt), which has the power to absorb water vapor, is sprayed over the tubes and it absorbs the vapor flashed in the evaporator. This absorption of water vapor in the solution reduces its salt concentration thus reducing its absorbing power. Weakened solution is continuously drained from the absorber and part of it is pumped to the generator in the upper shell to be concentrated; the rest is pumped to the eductor.

Heat Exchanger: Since this weak solution going to the generator is relatively cold and should be preheated, and the strong solution leaving the generator is hot and should be cooled (to increase its absorbing power) a heat exchanger is provided. This saves steam and condensing water.

Eductor: Weak solution pumped from the absorber is divided into two flows: (1) solution to the generator and (2) solution to the eductor. That part which is pumped to the generator is concentrated and becomes strong solution. The remaining part passes through the eductor at high velocity. The high velocity induces a flow of strong solution into the eductor where it is mixed with weak solution. This mixture is then sprayed into the absorber.

Steam Ejector: Function of this device is to remove non-condensables from condenser and absorber. Water jet augments function of steam ejector in maintaining low steam-jet condensing pressure.

the south wing, which is nearly identical to the north wing. All bedrooms have been equipped with the Carrier "Conduit Weather-master" system. This was selected by Erich B. Utescher, Supervising Engineer of the Kirkeby Hotels, and Paul McNamara, Manager of The Warwick, as best suited to their conditions.

This system uses dehumidified air, distributed at high velocity through relatively small ducts to the individual room units. An advantage of this type of installation is that aside from the small room unit, the only space taken up in the bedrooms is an enclosure approximately sixteen inches square in the corner of alternate rooms. The air and water risers are contained in this enclosure, or chase, and also the water risers for the bathroom heating system (see Fig. 1).

New Pipe Chase Allows Uninterrupted Occupancy

In the latest installation, the enclosures are to be made of sheet metal and filled with fireproof insulation. This will eliminate the loss of revenue which resulted from gypsum block and plaster chases. In the latter case, the rooms had to be stripped of furnishings and were out of commission for several days. The metal enclosures may also be used to screen the pipes during installation, and thus keep the rooms occupied.

One of the features of the "Weathermaster" system which appealed to the management of The Warwick is the fact that there are no moving parts in the room units. Other than for periodic cleaning with a vacuum cleaner, no servicing is required in the guest rooms. The dehumidified air from the risers is ejected silently, but at high velocity, through nozzles in the plenum of the unit. These jets of air induced air from the room across the water coil of the unit. This provides either heating or cooling, depending on the season.

As the flow of water through the coil is thermostatically controlled, the guest selects the desired temperature by turning a dial on the unit. The exterior bathrooms are heated by a hot water convector system, the water temperature being controlled in the apparatus room according to outside temperature.

Penthouse Machinery Room

The central station apparatus for the new system will be located in the penthouse above the twentieth floor ceiling. This house was built during stage three, at the time that the second group of rooms was conditioned. With expansion of the system in view, the penthouse was made large enough to accommodate two refrigeration machines and two sets of apparatus. Sufficient electrical power for all fans and pumps was provided at the same time.

Extra refrigeration capacity has been provided at each step, so that when the machine for this step is installed, there will be enough capacity to condition the entire hotel. As related earlier, the first machine was of the centrifugal compressor type, driven by a 200 horsepower electric motor. As space in the basement was limited when the second machine was installed, a 200 ton Carrier steam absorption refrigeration machine was selected (see Fig. 2). This had no moving parts, except a small pump. The new machine will be of the absorption type, with a capacity of 270 tons.

Steam Absorption Refrigeration Units

These machines use no refrigerant other than the chilled water itself. The return chilled water is sprayed into absorber-cooler section of the machine, which is held at nearly a perfect vacuum. Part of the water flashes, cooling the remainder to a predetermined temperature. The vapor given off is absorbed by a salt solution, which in turn is pumped to the generator-condenser section. The dilute solution is heated by steam, part of the water boiled off to reconcentrate the solution, and returned to the absorber. The water vapor resulting from this is condensed and returned to the cooler. (For a diagrammetric explanation of the system, see Fig. 3). Condenser water is, of course, cooled in a cooling tower.

When scheduling an installation of this sort, the usual procedure is to start work in the early spring and have the plant ready for operation at the start of the cooling season. In Philadelphia, however, the time between the end of heating and start of cooling season is very short. As the heating equipment is to be replaced by the air conditioning system, it was decided to install in the summer and be ready for the coming heating season.

The fine results previously accomplished are due to careful advance planning and perfect cooperation between the Hotel management and the contractor. Responsibility for the advance preparation for the Kirkeby firm was in the hands of NAPRE national past-president, Erich B. Utescher. Another NAPRE member involved not only with some detail work at time of installation of each stage, but with final operation as his major occupation is Wm. H. Laverty, The Warwick's Chief Engineer. Experience of the supervising and chief engineers aids materially. Duplication and delays of work have been avoided, thereby reducing the total cost; and the hotel has been able to carry on business as usual with practically no loss in revenue.

NAPRE

Question Box

The National Educational Committee, NAPRE, answers monthly in this column, operating problems forwarded by members. The Committee appreciates answers from the field. Both questions and answers should be addressed to Prof. H. G. Venemann, 269 Littleton St., West Lafayette, Ind.

More on Finned Type Evaporator Surface

QUESTION NO. 1006: Where can I find a table or data on the proper lengths of finned type evaporative surface to be used with a single expansion valve? I can see where such cumulative data might be quite involved, since it would vary with the pipe diameter, the fin surface, the T.D., and possibly the rating of the expansion valve, gas velocity, etc. Anyway manufacturers of certain coils I have been using with F-12 have not supplied any data.— G.V.B., Chicago.

ANSWER: The determination of proper length of tube in any evaporator is the function of the gas velocity, density and

TABLE 13 — BTU PER HR LOAD LIMITATIONS FOR A SINGLE COIL OR COIL FEEDER CIRCUIT

O. D. Tube in Coil	Int. Tube Area Sq. In.	Suction Temperature in Evaporator — Degrees Fahr. Freon 12 — Methyl — Sulphur −25°	+5°	+23°	+45°	Ammonia −25°	+5°	+23°	+45°
5/8"	.25	1600	3000	4800	7400	2600	5000	7000	12000
3/4"	.37	2300	4800	7000	11000	3800	8000	10000	17000
1"	.66	4000	8400	12000	18000	6700	12000	18000	30000

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Table capacity data has been developed on basis of 900 fpm gas velocity through the evaporator coil.

type of refrigerant. Number of bends should also be considered from the standpoint of pressure drop through the circuit. For all practical and generally encountered conditions, however, we have found it expedient to develop a simple reference table which may be applied. Table 13, page 31 of the Rempe Engineering Data Book gives information for various refrigerants at different suction pressures.

To closely compute proper size tube or number of circuits for any coil at a given evaporator temperature, the following formulae may be used. Gas velocity through evaporator should be maintained at 700 to 1000 fpm.

$$C = \frac{A \times B \times 2.4}{V} \text{ where,}$$

A = Wt. of refrigerant to be circulated in lbs. per hour at a given suction temp.

B = Volume of gas in cu. ft. per lb. at given suction temperature.

C = Internal area of tube required in evaporator in square inches.

V = Velocity of refrigerant gas in ft. per minute.

Then, $\frac{C}{\text{Int. tube area sq. in.}}$ = No. of circuits required in coil.

These tables would apply whether evaporator is fed by a single outlet valve or a multi-outlet type. In the case of multi-outlet valves, the Btu loads are those that would be handled by a single feeder circuit on the valve.

In the air-conditioning or comfort cooling range, it is customary to allow approximately ¾ to 1 ton of refrigeration for each ¼ in. O.D. feeder tube on a multi-outlet valve operating at 45 F suction pressure.

Another general rule is to provide an air-conditioning coil with approximately 32 to 35 feet of ⅝ in. O.D. tubing having 7 fins per inch on 1½" centers per ton of refrigeration at 45 F suction.—A. G. Vogel, Chicago

Converting Ice Maker to Latent Heat Tank

QUESTION No. 1016: We have a 500-lb. ice-making unit which the customer would like converted to an ice building set-up, to be used in a creamery for cooling cream after pasteurization.

The ice maker consists of a one-ton capacity highside with 1½ hp motor. The evaporator consists of an insulated tank about 3 x 3 x 4 ft. inside measurements with submerged coils. The tank was filled with brine and ten 50-lb. ice cans were suspended in same. Fed by expansion valve (no equalizer). The outfit produced 500 lbs. of ice every 12 to 13 hours under actual conditions.

The creamery now has an ice builder which was to be adequate for their needs, but never has been. So they would like this other as auxiliary equipment.

Their present ice builder consists of a 2 hp condensing unit operating 4 cold plates, 2—36 x 42-in. and 2—36 x 54-in. spaced 6-in. apart in fresh water bath. One small plate and one large plate in series are fed by a Sporlan (type G) expansion valve; thus, 2 expansion valves are used. Electronic device controls thickness of ice.

My experience has been that the two sections do not build equally. One section gets ahead — then the other. I figured that these expansion valves should have been of equalizer type or all placed in parallel. It never has been satisfactory. Originally it was designed to build enough ice to cool 2400 lbs. of cream from 65 to 40 F.

I would appreciate some advice on this problem. Perhaps there would be better evaporator coils for this purpose than plates. Perhaps the expansion valves should have been equalizer types, etc. — PMS, Wyoming.

ANSWER: In the design of an ice builder there are several things to be considered that do not apply to other types of submerged evaporators.

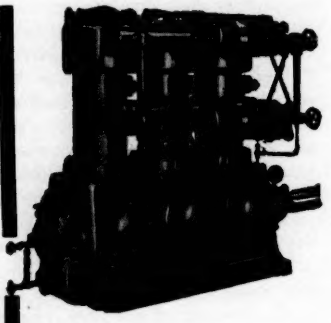
First, there is the matter of building up the mass of ice to take care of the load; and secondly, there is the matter of melting it uniformly when it is needed.

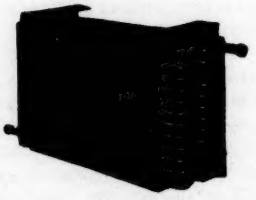
This necessitates proper water circulation around the evaporator. I believe that the cold plates are used because they act as baffles to direct the water flow. You will note that there is one long and one

The Case of the Dead Giveaways!

By HOWE . . . THE WORLD'S CHILLER

Business seemed good, but John Q. Engineer was worried. Something was missing . . . namely profits! He called in a Howe "private eye" who went quickly to work and later sent in this report: "The culprit gave himself away. Variable temperatures and humidities were exposed, caused by the obsolete inefficient refrigeration system. Dead giveaways!"
And now? John Q. has new Howe tested equipment. Gives him *exact* temperatures and humidity at *all* times. Better production, risk of spoilage cut to the bone. Product perfection through controlled refrigeration make John Q.'s profits *real.* Departing for his next case, the Howe "private eye" said, "Your new Howe will keep running longer, with less trouble. Over 42 years' specialization does the trick."





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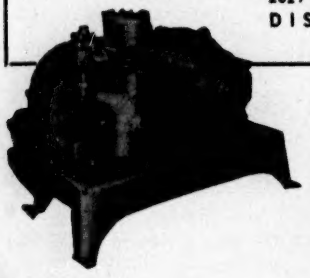
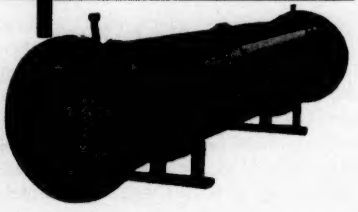


CONSULT HOWE on all your refrigeration problems. Since 1912 manufacturers of ammonia compressors, condensers, fin coils, locker freezing units, air conditioning (cooling) equipment. Immediate delivery!



short plate for each circuit in your customer's present ice builder. I believe that this is a good arrangement for it permits the water to pass around the end of the short plate; thus, increasing the water velocity.

Regarding refrigerant circuit — with "Freon-12" there must be a compromise between gas velocity and pressure drop through the coils. If the coil circuit is long, there is an appreciable pressure drop at the compressor; thus, reducing its capacity. If the coil is split up into shorter lengths and operated in parallel with liquid and suction headers on one expansion valve, the gas velocity may be insufficient to carry the oil along.

It is a very difficult matter to secure exactly the same feed, through coils with either a multiple-feed expansion valve or with two or more valves; hence, the unequal build-up of ice on his present two sections. I can think of no arrangement of coils, valves or water distribution that would guarantee equal build-up on two or more sections, because just as soon as one coil or plate accumulates just a fraction of an inch more ice than another, the rate of heat transfer through that coil is reduced and the other coil begins to catch up.

Why not add some coils to those in the old ice tank and insert two or three vertical baffles in the tank to direct the water flow? It would not cost much and it is bound to do some good.—HGV

Carbon Dioxide Uses

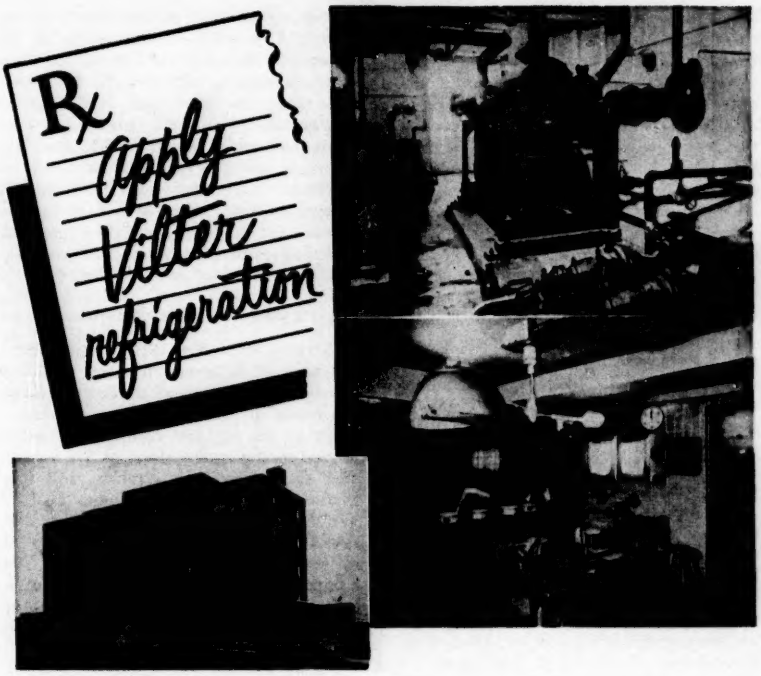
QUESTION No. 1017: Being interested in production of CO_2, I would like to know what information you have regarding present extensive uses for CO_2 (Carbon dioxide) in liquids and solids? — CJC, Iowa.

ANSWER: In general, the applications where most Carbon Dioxide is used can be classified as follows:

1. *Fire Extinguishing Equipment.* Considerable quantities of Carbon Dioxide are used in connection with fire extinguishing equipment. You are undoubtedly familiar with the common portable high pressure fire extinguisher. I would like to point out, however, that there are many fixed fire extinguishing systems installed in this country using bulk low pressure Carbon Dioxide. The storage tank on these systems may have a capacity running from a minimum of 750 pounds to as much as 40 tons of low pressure Carbon Dioxide. Such systems are designed to protect not one, but ordinarily all of the various hazards in a given location from one central storage supply of Carbon Dioxide.

Low pressure Carbon Dioxide is also used on Mobile equipment, such as Airport crash fire trucks. Since Carbon Dioxide is a very rapid extinguishing agent, it is especially useful on gasoline type fires that cannot be extinguished quickly with water spray or other agents.

2. *Beverage Carbonation.* Considerable quantities of Carbon Dioxide are used to carbonate soft drings and also in connection with the bottling and handling of beer. Of course, breweries generally produce the needed Carbon Dioxide from



Patient: Johnston Memorial Hospital
Smithfield, Johnston County, North Carolina

Description: Patient very young, opened in 1952. 100 beds. Modern design, latest equipment.

Condition: Patient needed dependable, accurately controlled cooling for a number of important functions: Air conditioning the Emergency Operating Suite, the Operating Suite, and the Delivery Suite; Providing refrigeration for meat at 20° F.; Providing 35° cooling for the dairy, vegetable, and garbage walk-in coolers; Maintaining proper temperature in the mortuary cabinet.

Prescription: Vilter self-contained condensing units and equipment of the proper size for each of these uses—a total of four units, comprising over 34 horsepower.

Comments: Patient comfortable, doing fine. Vilter refrigeration is "just what the doctor ordered."

Attending: Architect: George Watts Carr, Durham, N.C.
Engineer: William M. Wallace, II, Durham, N. C.
General Contractor: T. A. Loving Co., Goldsboro, N. C.
Air Conditioning and Refrigeration Contractor: Morris & Gorrell, Inc., Raleigh, N. C.

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the fermentation vats; however, they sometimes require additional quantities of pure Carbon Dioxide.

3. *Low Temperature Operations.* You are apparently familiar with the use of dry ice in connection with certain machining operations. Dry ice and also low pressure liquid Carbon Dioxide are extensively used for low temperature tumbling of molded rubber products and similar elastomers. The purpose is to freeze the flash rubber that remains at the parting line after molding. This flash has been easily broken off by tumbling in the large barrel.

Dry ice and liquid Carbon Dioxide are also used in test equipment to maintain low temperatures for test purposes. For example, firms developing and manufacturing equipment and parts for airplanes must test such equipment at temperatures near minus 85 F and even lower.

4. *Explosion Prevention.* Carbon Dioxide is finding increasing use as an inerting medium to eliminate an explosion hazard that might otherwise develop when repairing certain equipment. For example, if a gas holder requires repairs, the combustible fuel gas it contains can be displaced with Carbon Dioxide vapor, which can then be displaced with air; thus, eliminating any possibility of developing an explosive atmosphere. After the repairs are made, the air can then be displaced with Carbon Dioxide before introducing the combustible gas. Gas holders, pipe lines, barges and other equipment have been handled in this manner. Some of the equipment has been so large that as much as 80 to 90 tons of Carbon Dioxide were required to complete the job.

Of course, there are many other applications for Carbon Dioxide. Many of the other possible uses are discussed in the book "Carbon Dioxide" published by the Reinhold Publishing Corporation. The authors of the book are Elton L. Quinn and Charles L. Jones.—H. V. Williamson, Chicago

"Freon-12" Vs. "Freon-22" For Air-Conditioning System

QUESTION No. 1018: Recently our company had installed an air conditioning system using Freon 22. The unit is driven by a 20 hp motor. Cooling is with an evaporative condenser. There is one evaporator coil having one expansion valve with distributors. Assuming that design and installation is correct, I would like to have someone compare this system as to efficiency and cost of operation with a like system using Freon 12. Another question I would like to have answered is, "Why should our large manufacturing companies even think in terms of F22 for air conditioning? What is wrong with F12?" One other thing, I am aware of the volumetric efficiency of the F-22 system with its line sizes smaller and the savings in weight cost. What I want to know is the over-all efficiency of operation. — S.A.C., Chicago.

ANSWER: The coefficient of performance for F-22 is slightly greater theoretically than that of F-12, but because the displacement of the cylinders for F-22 is only 62.6 percent of that for F-12, its volumetric efficiency and also its compression efficiency is likely to be less. This will result in the actual coefficient of performance of an F-22 compressor to be about the same as that of an F-12 machine. In other words, the overall efficiency of operation will be the same. I see no advantage in using F-22 over F-12 in air-conditioning applications except that of obtaining greater capacity with compressors of equal displacement.—H.G.V.

Ice Production Problems

QUESTION No. 1019: If two compressors of different rpm are working on one ice tank, and the connections are made in this way that the connections of the smaller compressor is attached in the connections of the bigger one, then what will happen, will this system not give more blocks of ice? Would you please advise the correct system? Will it not give more blocks of ice having the same rpm of the compressor but making the ice tank larger than actually is sufficient for the same compressor or plant? M.A.Q.

ANSWER: Yes, two compressors working in parallel on one ice tank will produce more ice than if only one compressor were in operation, because the two compressors will pump more of the gas from the coils; thus, lowering the suction pressure and the evaporating temperature. This in turn will result in colder brine and a faster freezing time.

More ice may be produced with a compressor having a fixed displacement if there are more cans and coils in a tank. With a greater number of cans and coils, the brine temperature can be raised and still produce a greater quantity of ice. With the higher brine temperature, the suction pressure will rise also, and the compressor will have greater capacity.

The latter system is the more economical and will produce the ice at a lower cost per ton.—H.G.V.

Rust Prevention for Ice Can Interiors

QUESTION No. 1020: We have been experiencing quite a bit of difficulty with rust forming in our ice cans and we have been approached by the Sudbury Laboratories, South Sudbury, Mass., suggesting that we use "Aqua-Clear", which is one of their products, to eliminate this difficulty.

We use sodium chloride brine in our tanks and we would like to get your opinion as to the practicability of using this product to eliminate rust. They have suggested that we use one ounce of "Aqua-Clear" to each 100 gallons of water. — AAL, Alaska.

ANSWER No. 1: If the water going into the cans has been overtreated with lime, its high pH value may have caused loss of zinc from the galvanized coating. This would leave the iron surface exposed and subject to rusting. Adding a small amount of ammonium sulfate, ammonium chloride or alum to the can water would reduce the pH value and thereby tend to prolong the life of the galvanized coating. It would not, however, present rusting of iron already exposed by loss of galvanizing.—K. M. Holaday, St. Louis.

ANSWER No. 2: One of our members who is in the water chemistry field, but who declines to be identified directly, has informed us that his analysis records indicate a glassy phosphate used as a sequestering agent. He suggests a water analysis. Such an analysis would in all probability indicate the same thing that Mr. Holaday noted.—JRK, Chicago

New Questions

Vapor Effects on "Freon"

QUESTION NO. 1021: I am in need of some information on the characteristics and traits of "Freon-12", especially such as the effect of air and moisture on the "Freon" when either enter the system. If you have any data on the above, please forward it to me, or let me know where to send for the information.—T.T.L., Idaho.

Liquid Trap Responsible For Lower Suction Pressure

QUESTION NO. 1022: In a cold storage and freezing plant, we used to make good time with 2 — 10 x 10 single acting compressors. Then as the plant grew larger, a third compressor, also a 10 x 10 single acting, was added; also a liquid trap. Now, before the trap was added, we used an accumulator and never got down to zero pressure on low side, but since the trap was added, we have to get 5 in. vacuum and cannot make the time we did. The trap is between the accumulator and compressors. Now does the accumulator form a pocket there, as the trap would work as an accumulator? Our high side runs from 120 to 150 psig normal; low side, 5 lbs. to 5 in. vac. We freeze sea food.—Claude Brewer, N. J.

Glycol Properties Sought

QUESTION NO. 1023: I would appreciate some information as regards eutectic solutions. The information I particularly need is mixtures to work at a coil temperature of minus 10 F. The specific heat of the mixtures, weights, latent heat removal and absorption capacities.

For example, from the A.S.R.E. Data Book (1946), I note ethyl glycol at a mixture of 38.5 per cent has a freezing point of minus 10 F. In freezing this mixture, do I ignore the ethyl glycol and use the water percentage in arriving at the heat removal to minus 10 F, and in figuring its heat absorption capacity, do I use the water percentage only?

I would like for you to advise which eutectic solution you think has the greatest heat absorption qualities per pound. Also qualities of "Prestone," glycerine and ethyl glycol.—J.Z.K., Balboa, C.Z.

Convert Boiler For Refrigerant Condenser

QUESTION NO. 1024: I just sold a 10x10 Worthington ammonia compressor with a synchronous drive to a cold storage plant. Since I am adding it to about 800 tons already in use, the condenser capacity now in use, which was already inadequate, is further insufficient. In anticipation of further expansion, they would like to have a 500 ton vertical condenser, but I haven't been able to secure such an item.

I do know where I can pick up a three hundred hp hrt high pressure steam boiler. Now I am wondering if I might remove the foot section from this boiler and stand it on end, and arrange for the proper inlets and outlets after around a 300 lb. hydrostatic pressure test, and solve my problem. I guess that first, I should know how I am to arrive at the tonnage capacity of this boiler as a condenser. Isn't there some way of calculating capacity by square feet of area exposed to the wash down, water temperature, and ratio of compression?—Harry Drake, Illinois

"U" Values For Uninsulated Floors

QUESTION NO. 1025: It has been the practice of the State of Wisconsin to place no insulation in floors placed on a gravel fill on grade (for rooms 25 F. and above). This has caused considerable controversy as to the U value for the heat gain thru the floor.

We know that ASHVE uses a U value of 0.10, yet in refrigeration texts we find for a 6 in. concrete floor with 2 in. of cork, a U value of 0.12, so that of a U of 0.10 cannot be correct. For a 6 in. concrete wall, we also know the U value (U = 0.79).

Can you tell us the U value that you would use to compute the heat gain thru an uninsulated floor on grade?—H.L.O., ME, Bu. Eng., State of Wisconsin.

Vendor Keeps Iceman Cool

NOT ALL vending machines work automatically all the time. One hot humid Sunday this summer an employee of the New York lumber yard that also operates an ice vending machine found it too uncomfortable to spend his off-day fishing or going to the ball game.

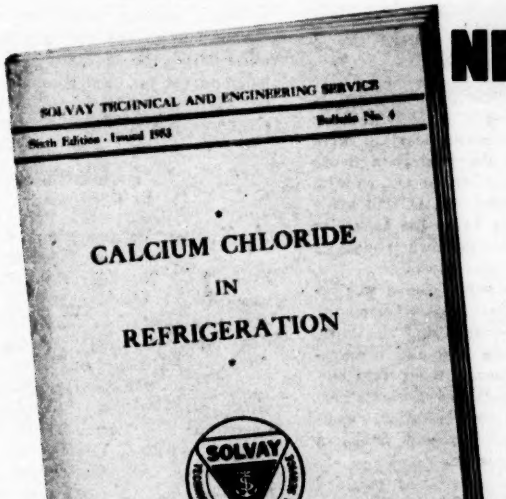
He retired inside the "automatic" ice box, tuned in the Dodgers on a portable radio and operated the machine manually. Happily surprised customers got the latest score along with their 50-pound bag of ice. And the operator had a comfortable Sunday afternoon.

New Insulation Business

THE Stoops Insulation Company has been started by Larry Stoops, with offices at 712 Donovan Building, June 1, 1954. Mr. Stoops has been building walk-in cold rooms for over 31 years, the last 21 of

Larry Stoops

which were spent in Detroit, using Styrofoam, corkboard, Foamglas, and Fiberglas as insulation. Mr. Stoops was vice-president and director of Parham Insulations for several years. He is an active member of Detroit Chapter, NAPRE, serving as Sgt.-at-arms for several terms.



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News Notes and Chapter Activities

Greater Dade County

JOHN M. MARIAKIS

MIAMI and Miami Beach refrigerating engineers recently petitioned national headquarters for a charter. The new group, to be named Greater Dade County Florida Chapter, held its first meeting on August 12 at the Biltmore Terrace Hotel in Miami Beach. Members-at-large present at this first meeting were Ted T. Hoover, chief engineer, Biltmore Terrace, and Charles W. Moneypenny, chief engineer, Kenilworth hotel. Other engineers joining Hoover and Moneypenny in signing the first petition were Jack Newalk, engineer, Biltmore Terrace; Walter J. Smith, assistant chief engineer, Biltmore Terrace; Justin Anderson, engineer, Coronado hotel; R. H. Wiskeman, engineer, Monte Carlo hotel; J. Frank Marchant, engineer, Lombardy hotel; Wm. G. Robison, engineer, Delano hotel; Ivan V. Joseph, engineer, Miami Battle Creek Sanitarium; Chas. M. Haller, chief engineer, Plantation Cold Storage; William E. Schachter, engineer, Delano hotel.

John M. Mariakis, New Orleans, La., represented the national association and made the principal address of the evening. He explained the aims and objectives of NAPRE, and emphasized the principal benefits to be obtained through forming a chapter. Another member-at-large who had expressed interest in forming a chapter, but who was unable to attend on the night designated, was Anthony J. Ruane, chief engineer, Algiers hotel. Mr. Ruane, however, signed the petition during a visit with the national deputy.

Others in Dade County who are members-at-large, but unable to attend this first organizational meeting, are T. F. Hall, Hall Machine Shop, New Smyrna Beach; George Beattie, Frozen Foods Inc., Miami, and Robert S. Wood, City Products Company in Miami. Subsequent meetings are planned at which time it is expected that the number of petitioners will be doubled and a charter installed before the year's end.

Milwaukee

"ANDY" ANDERSON

THE August meeting was held at the Milwaukee School of Engineering. Harry Behmke, Cudahy Bros., reported a problem they had encountered. They were concerned with a room where they stored approximately 1,000,000 pounds of cheese that had been lightly paraffined. Bert McKenna, Central Cold Storage Co., and National Director of NAPRE, led a discussion of possible solutions. The solutions included using colder brine to remove moisture, with supplementary heat to maintain the room temperature at the desired 31 F, and the use of dry calcium chloride dessicant. Mr. McKenna pointed out that successful use of calcium chloride required a blast tunnel to get enough circulation of air. The practice in his plant was to place the dessicant in several staggered layers to get as much exposure surface as possible.

Paul Reed, International Educational Director, Refrigeration Service Engineers Society, spoke on some of the historical aspects of small refrigerating machines. He mentioned that the original refrigerators were assembled in the field, the manufacturer supplying the refrigeration system and the customer supplying a good quality ice box. The first step toward mass production was the factory assembled refrigeration system and cabinet. The second step was the complete hermetic system inaugurated by General Electric with their monitor top design. Mr. Reed thought that there might be a trend away from the complete hermetic system, making the compressor easily detachable from the evaporator and condenser, in order that service in the field might be simplified. His talk was historical and informative — appealing to the operating engineer.

Guests among the members present at the meeting including Mr. McKenna, were Art Clementson, Julian Engineering Company and president Chicago Chapter, Dick Kelahan, National Secretary, and his brother, Tom.

Texas Coastal Bend

VERNON KUMMEL

THE meeting of July 20 was called to order by President R. A. O'Neill. After minutes of the preceding meeting were read and approved, the 1953 Data Books were given to all members present, as were the study course books. Mr. O'Neill made an offer by Southern Texas Ice & Service of a $25 savings bond to the first member who brings in eight new members.

Chapter I in the study course was reviewed by Dan Miller, who discussed the principles of refrigeration and the basic units used to measure heat and temperature. Standards of measurement were outlined, such as Btu's ton of refrigeration; specific heat; latent heat of fusion, vaporization, and sublimation; and finally a brief discussion on energy.

The August 17 meeting was presided over by President R. A. O'Neill. The minutes of the previous meeting were read and approved. The 1954 Data Books were passed out to those present. The meeting was then turned over to Dan Miller, the instructor.

Members had studied their first chapter of the refrigeration course since the meeting of July 20, and a more thorough discussion of the basic principles was made by Dan Miller. Two of the members, Dick Kiper and Ed Black "volunteered" to work out a problem on the blackboard. They found the amount of heat required to be removed from 2000 lbs. of water at 85 F to make ice at 18 F. The questions at the end of Chapter I will be answered at the next meeting by members who volunteered for these assignments.

Los Angeles

FRED HERR

LOS ANGELES Chapter opened its fall series of meetings with its traditional Ham-and-Beans dinner and entertainment program at the Terminal Club, September 22. Under the direction of Ed L. Nelson, chairman, entertainment committee, the events included a social period from 6 to 7 pm, with musical diversion furnished by a piano player presenting request songs for rendition by groups of NAPRE vocalists; a ham-and-beans dinner at 7 pm., during which a wandering songstress regaled the diners with popular songs; and a brief business session at 8 o'clock. To wind up the evening, Nelson provided a floor show program of singers and dancers.

With Los Angeles chapter planning to entertain the 46th annual NAPRE convention in Los Angeles in 1955, chapter officers held a number of meetings during the summer months to determine ways and means of financing the convention. This matter will be brought before the November 4 meeting by E. T. Quinn, treasurer, and other members of the general convention, at which time further details are scheduled for consideration.

Membership chairman Frank G. Muzzy and his chief assistant, W. R. Burnett, expressed confidence that Los Angeles chapter has more than a fair chance of winning this year's national membership drive. In a recent mailing piece they urged the membership to exert an additional bit of effort during the closing weeks of the campaign to the end that another trophy may be added to the several of which the chapter already boasts.

St. Louis

KEN HOLADAY

AN attractive program for the 1954-55 season is in the making at St. Louis. The Chapter's Executive Council was called together August 25 by President Stan Tatalovich, Griesedieck Brothers' Brewery, represented by Chapter Vice-President Ed Lotte and Bill Allen, was host. Refreshments and a pleasant atmosphere contributed to a fruitful conference. Committee assignments to be announced at the September Chapter meeting were agreed upon, and tentative plans were laid out for a well balanced program of educational classes, discussion of questions on current operating problems, technical speakers, and social events.

Tacoma

ELMER JOHNSON

TACOMA held its first fall meeting September 1. Guest speaker was Jas. A. Callender, who lectured on insulation of cold storage ground floors, and construction of modern cold storage warehouses. His talk was interesting and informative, based on personal experiences. (See IR,

(Continued on page 43)

Member Comments on Experiments on Effect of Radiation Freezing of Packaged Peas

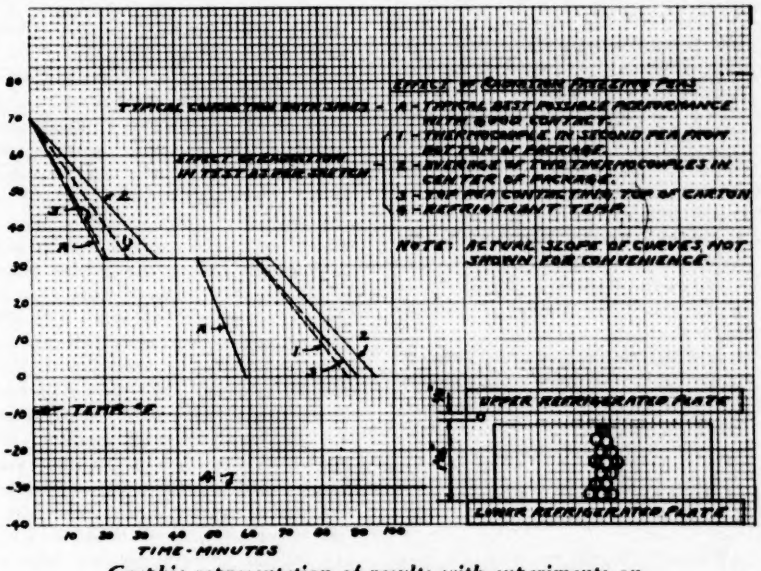
TO THE EDITOR: I was interested in the recent discussion of the effect of radiation in refrigeration problems under No. 1003 in the Questions and Answer column.

During the past eight years in Canning Machinery Div., Food Machinery Co., we have conducted numerous tests on freezing various products. We have always been looking for indications that would help us evaluate radiation in package and bulk freezing.

The attached curves graphically show a value obtained by radiation in freezing peas. A study of the curves shows its magnitude in the freezing of a package wherein the work is done by radiation from the top and conduction from the bottom. Also shown is a curve "A" obtained by conduction only, the packages being identical.

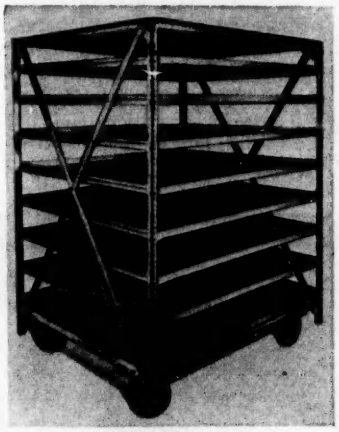
These are the most tangible results we have obtained and substantiate, in my mind, the rule that the effectiveness is as to the square of the distance, all other things being equal.

Regarding curve "A", we do not feel this performance is commercially attainable and indications are that at least 10 percent time must be added for actual practice. With 10 percent time added the majority of the packages will be on this corrected time curve by statistical average. The variables of inside and outside contact combined with such things as pea maturity make it difficult to accurately predict the end result for any one package.—H. B. Roberts, San Jose Chapter.



Graphic representation of results with experiments on radiation freezing of peas.

FREEZER TRUCKS



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The Roosevelt and John Bryner To Welcome NAPRE Convention

FRANCIS A. YOST
Construction Engineer
Pittsburgh-Corning Corp.

THIS is not as much a pre-convention article as it is a story about a "Chief Engineer's Chief", for this is a story about John J. Bryner, a past national president, NAPRE, and the Chief of the Roosevelt Hotel, New Orleans, where the 45th Annual Meeting will be held November 2 through 4.

For 30 years, John Bryner, has been building a plant of which he could be exceptionally proud, and from my very close inspection it appears that he has attained his goal. A 14-floor annex, known as the Westminster Building, has just been added to the Roosevelt. To be shared by the Shell Oil Company and the hotel, the Roosevelt occupies the 8th to the 14th floors inclusive. This will be an additional 200 rooms, bringing the capacity of the hotel to nearly 1,000 rooms.

Room Conditioning Employs Double Duct System

When you come down to old New Orleans for the convention November 2-4, John's dream should be nearly completed and he will be only too glad to explain in detail the many unique features of this plant. He will probably tell you his ideas on good air conditioning for hotels. He has designed a dual duct system that assures a 25 percent fresh air inlet in each room. A mixture of refrigerated air and warm air gives a near-perfect humidity control. Air is removed from the rooms via door louvres, and transmitted through the hallways into large recirculating ducts.

For an idea of the size of this air conditioning plant, visualize a total capacity of 2,430 tons, composed of two 650 ton, one 690 ton and one 440 ton units. These are variable speed steam-turbine-driven condensing units for chilling water which is circulated to the various floor zones in the hotel. As an example of plant efficiency, the new assembly hall, the International Room (14,700 square feet), seating 2400 people, may be completely purged with 100 percent fresh air in a matter of few seconds. However, while the room is in use, Dorex (activated carbon) filters are used for odor removal. Smoke haze and other impurities are removed from the air by Trion electrostatic filters large enough to clean air for 40 average 6-room homes, removing particles as small as 0.000025-inch.

Minneapolis Honeywell controls are used to regulate the York compressors in the Freon 12 system to this and other public rooms. The Roosevelt cooling tower, composed of six cells with approximately 9,000 gpm capacity, assures an adequate cooling water system. Incidentally, the delegates and visitors must see the Chief's 18-inch return cooling water lines, 210 feet high.

NAPRE President, Leo J. Vivien (left) and John T. Bryner, Chief Engineer, Roosevelt Hotel, go over plans for the forthcoming convention at New Orleans, November 2-4.

Sixteen Cold Rooms For Catering Department

Members and guests in attendance at this convention will have a chance to see the hotel's new coolers and freezers. These total 16 rooms with temperatures varying from minus 10 to 40 F above zero for the storing of meat, vegetables, fish, ice cream, etc. There will be a capacity of approximately five carloads of foodstuffs in the new coolers alone. All of the new boxes and refrigerant piping in conjunction with these cold rooms are insulated with "Foamglas", the rigid cellular stay-dry insulation. Engineered so that in no case will there be a greater temperature differential of 10 F between room temperature and refrigeration temperature, the estimated load of these 16 boxes is approximately 100 tons. Eleven multiple cylinder compress-

Checking "Foamglas" insulation on a chilled water line discharge valve of air conditioning units at Roosevelt Hotel, are John Bryner, chief engineer; F. A. Yost, Pittsburgh Corning, and NAPRE President, Leo Vivien.

Smiles of anticipation reveal the nature of this important pre-convention test. F. A. Yost, John Bryner, Leo Vivien, check quality of Vogt tube-ice cubes to be used in members' refreshments during convention.

ing-condensing units varying in capacity from 5 to 15 tons will handle this load. Failure of any one unit will not cause any serious trouble since all systems are inter-connected for emergencies. Standard coils and fan units by Marlo of St. Louis are used in the individual rooms. Condensing equipment is by York. Leo S. Wile and Walter B. Moses, consulting engineers, New Orleans, designed the complete refrigeration system.

Bryner Unofficial Convention Host

Actually, Louisiana Chapter No. 2, NAPRE, is the official host for the convention, but John Bryner easily qualifies as unofficial host. He started his career in New Orleans working in the electrical department of the public utility company. He left the utility company to go with United Fruit Company where he worked from certificate up to a chief engineer's license on many vessels of that line. John still retains his chief's ticket. He is also a registered professional engineer in both electrical and mechanical engineering, and is the Chief Examiner for the City's Stationary Engineer's License Bureau, New Orleans.

In the Chief's office hang many citations and licenses, but the one of which he is most proud is the first-class operating engineer's license issued by the City of New Orleans; for although he supervises engineering and construction operations of both the Roosevelt and the New Orleans hotel, at heart he is still a practical engineer. John, in addition to being past president of NAPRE, having served in 1942, is also a member of National Association of Power Engineers.

Where does he get that title of Chief Engineer's Chief? Members at New Orleans informs us that John's more silent achievements have been the training of young men, teaching them all he knows. Many chief engineers in the New Orleans area started with John Bryner, hence the title; and also explaining John's deep-rooted interest in NAPRE. Come on to New Orleans in November, you fellows who know John, and say "hello" again. For those members and guests who haven't had the pleasure, come on down and see what sort of a man it takes to acquire this kind of a reputation.

Chapter Activities

(Continued from Page 40)

Jan., page 13 and July 1954, page 15 for a paper by Mr. Callender and a story on a plant of his design.)

Memphis

CHAS. CONLEY

ON WEDNESDAY, August 11, 165 members, friends, their wives and children, attended the Chapter's annual watermelon cutting, and ate up 1520 lbs. of melons. They were, as usual, Doug Smith's choicest melons, served to the guests on okra cutting tables which added to the party novelty. A very interesting picture, "Florida Everglades", completed the entertainment. Educational meetings were resumed the first Wednesday of September.

Make Yours a Vocation Vacation

National Association Practical Refrigerating Engineers

45th Annual Convention

November 2-4, 1954.

Roosevelt Hotel, New Orleans, La.

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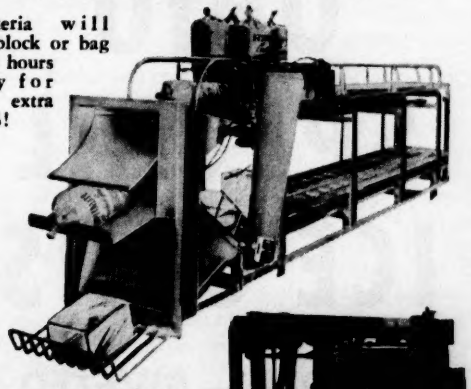
Ice-A-teria will vend block or bag ice 24 hours a day for those extra SALES!



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FLEXIBLE RUBBER DOORS

NOW USED IN THE REFRIGERATION INDUSTRY AS INTRA-COOLER, FLAPPER AND VESTIBULE DOORS

Protect Against

LOSS OF CONDITIONED AIR in cold storage rooms, spinning rooms or other areas with controlled temperature, humidity, etc.

COSTLY TRAFFIC DELAYS in material handling due to stopping or slowing down for opening of doors.

HIGH COST OF REPAIRS of solid-type doors.

Made of reinforced, resilient, tough rubber sheets, suspended from steel frames. Built-in, double acting springs. Used by many of the biggest names in industry. Eliminate damage common to solid-type doors. Write for descriptive literature.

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Book Review

PRINCIPLES OF ENGINEERING THERMODYNAMICS. Second Edition. By Paul J. Kieffer, U. S. Naval Postgraduate School; Gilbert F. Kinney, U. S. Naval Postgraduate School; Milton C. Stuart, Lehigh University. Published by John Wiley & Sons, New York. Illustrated. 564 pages. Price $7.75. For sale by Nickerson & Collins Company, Chicago, Ill.

The advances in thermodynamic thought since publication of the first edition of this book in 1930 have necessitated a complete revision, according to the authors. It has been completely rewritten, following eight years of development work on the part of the authors. The experience of a number of teachers who used the first edition for almost a quarter of a century has been incorporated. At the same time the material of the new edition has been used and tested in mimeographed form in a number of classes during the development period, with favorable reaction on the part of teachers and students. Messrs Kieffer and Stuart, who wrote the first edition, have a rich practical experience in engineering and teaching, and Dr. Kinney's background as physical chemist, chemical engineer and teacher helps to give the book a breadth of viewpoint.

Ice Display Decorates Theatre Opening

A SPECTACULAR display of ice was presented in connection with the opening of the New Fox Theatre in Portland, Oregon. It was a representation of the Fox Theatre Building placed behind a buffet table loaded with food. Located near a bright green curtain was an ice cake containing 30 colored electric lights, each on an individual flasher so that the lights were constantly changing, winking on and off, making an ever-moving rainbow effect.

Overhead spotlights were beamed on the display which brought out all the glitter and sparkle of the crystal ice. The huge Neon sign of the Fox Theatre was reproduced, with the F in red, the O in green, and the X in yellow.

Almost a ton of ice was used in the display. The sign itself was about 40 inches high and projected above the top of the building about 30 inches.

Youngstown Cold Storage Elects Officers

AT the organization meeting of the board of trustees of the Youngstown Cold Storage Co., Youngstown, N.Y. the entire slate of officers was re-elected to office, including president and treasurer, Wilbur Shumaker; first vice president, Frank Lutts; second vice president, W. Douglas Hopkins, and secretary, Ray C. Tower.

New England Association Fall Meeting

THE FALL meeting of the New England Ice Association was held at the Snow Inn, Harwich Port, Mass., September 15-16. The group had exclusive use of one of the larger guest houses for the meeting. Snow Inn is located on the water, overlooking Nantucket Sound.

Danes Seek Business

A DANISH firm (Atlas, S.A.) has made an offer to the city of Guayaquil to build a refrigerated warehouse there for some $12 million. The municipality reportedly has the bid under consideration.

BATEMAN—*Gasoline Engine*
ICE CRUSHER
for TRUCKS

Will take a 25 lb. regular or a long 50 block of ice.
Hopper opening 12" x 10½"
Four grate adjustments by turning the handle making from pea size to 1½ chunks.
Chain driven.
Galvanized for the prevention of rust.
Brackets for holding crusher to side of truck.
Guard covers chain and sprockets.
Shell of steel construction.
Briggs-Stratton engine, two horsepower, 6 to 1 gear reduction, retrievable rope starter.

Completely Galvanized to Prevent Rust

The Bateman Drum has solid ends to prevent ice from laying inside drum. Drum and shaft welded as one unit so no shaft coming loose on drum. Teeth are in rows rather than staggered to make better ice and less snow. Teeth can be changed from the outside of the drum in a very short time. Teeth are welded to bar that is set in taper wedged into the drum, making it impossible for teeth to come loose.

Complete selling price, Shipping weight 250 lbs.

$230.00

Bateman

MINERAL WELLS, TEXAS

Ice Processing Equipment

OHIO SPECIAL ICE CANS

WELDED — RIVETED

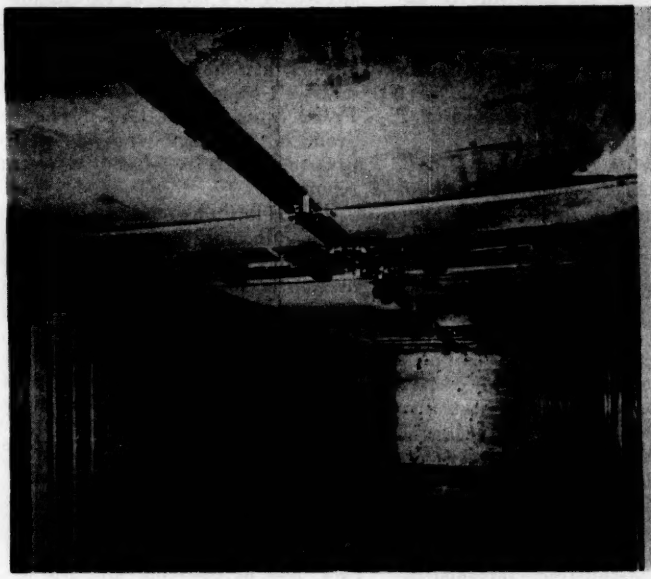
ICE CAN GRIDS

Industrial Trucks

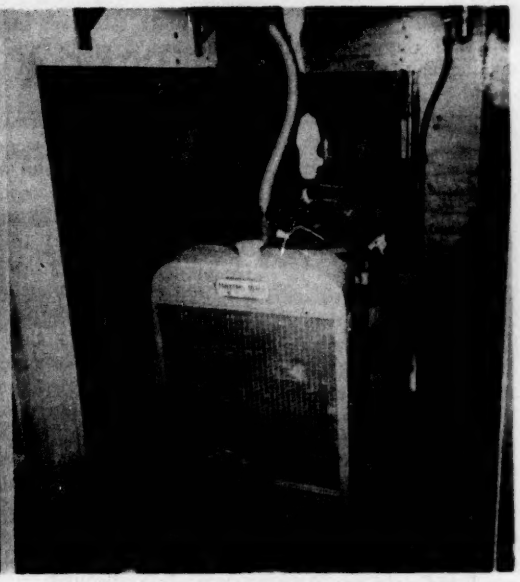
and Trailers

THE OHIO GALVANIZING & MFG. CO.
NILES OHIO

New Mechanically Refrigerated Car uses Diesel Driven Condenser Unit with Holdover Plates.



Interior of converted Chicago & North Western Car. Holdover plates are installed in space formerly used by air distribution ducts. Use of heavy eutectic heat transfer plate eliminates necessity for standby compressing condensing unit.



Interior view of North American Car Co. converted salt-ice reefer. Direct connected diesel compressor condensing set occupies only one former ice bunker. Refrigerant is Freon 12.

A NEW type mechanically refrigerated car has been developed by the Dole Refrigerating Company, Chicago. This car was previewed by officials of the Chicago & Northwestern Railway system and guests recently at the Chicago & Northwestern passenger station in Chicago. Converted for mechanical refrigeration by the North American Car Corporation, the equipment was designed by the joint efforts of the Dole Refrigerating Company, Saylor Beall Manufacturing Company and the Fairbanks Morse Company.

Condensing Unit Direct Driven

The system consists essentially of a diesel driven condensing unit and holdover plates. The manufacturer claims that by driving the condensing unit directly from the diesel engine, all electrical equipment and most electrically operated control devices are eliminated. The engine and condensing unit are installed in the space formerly occupied by one ice bunker and the other ice bunker is now available providing approximately 10 percent additional cargo space. Holdover cold plates located in the ceiling occupy the same space formerly required for air circulation.

The unit is not only adaptable to new car construction, but also lends itself readily to the conversion of existing cars with a minimum of modification and expense.

Test Car Provides Product Insurance

The test car displayed is equipped with a 16 hp Fairbanks Morse diesel unit driving a four-cylinder Brunner compressor. A specially designed condenser and a bypass arrangement designed by the Saylor Beall Manufacturing Company completes the high side of the equipment. The low side consists of Dole holdover plates which, besides providing direct evaporator surface, also provides product insurance by their ability to maintain temperature even though the condensing equipment is not in operation. This feature permits the elimination of the electric standby unit.

Varied Temperatures May be Obtained

While this car is designed primarily for low temperature application and is capable of maintaining temperatures as low as minus 15 F. it can be automatically controlled to any temperature that may be desired.

USDA Reports Decline In Dairy Price Supports

THE U. S. Department of Agriculture reports that total purchases of three dairy products by the Commodity Credit Corporation under the price support program continued to decline in August 1954, with purchases substantially below those in July and about 28 million pounds less (about 38 percent) than in August 1953. Butter purchases in August 1954 were 50 percent below those in August 1953.

Purchases during August 1954 amounted to 13,441,346 pounds of butter, 16,976,783 pounds of cheddar cheese, and 45,394,495 pounds of nonfat dry milk compared with purchases of 27,067,625 pounds of butter, 30,273,094 pounds of cheese, and 47,261,979 pounds of nonfat dry milk during August 1953.

Distribution and sales of dairy products by CCC during August 1954 totaled 23,752,515 pounds of butter, 12,022,370 pounds of cheese, and 105,642,158 pounds of nonfat dry milk. Of these totals, commercial export sales amounted to 294,586 pounds of butter, 96,558 pounds of cheese, and 175,000 pounds of nonfat dry milk. Cheese sales amounted to 1,124,687 lbs.

National Ice Association Lists Manifold Services

A FOLDER designed for non-members has been issued by The National Association of Ice Industries to present the Association and list the various services that are available. It also will serve to remind members of the extent, the nature, and the value of the association services which they make possible by their mutual cooperation and continued support.

It points out that the National Association of Ice Industries is a voluntary organization of alert ice manufacturers and distributors working together for the purpose of developing and protecting the Ice business. It provides informative, consultant and advisory services to use in the planning and management of their Ice operations. It enables member companies to work together on programs and activities in which they are mutually interested and which can be undertaken more economically on a group basis. Specific services are listed as follows:

Research and Marketing Facilities: Constantly working to devise ways to sell more Ice, through better sales promotion and improved merchandising, the development of new applications and uses for Ice. NAII reminds customers and the public that the proper use of ice means greater pleasure and profit for them.

Conferences and Conventions: To disseminate information on developments within the industry, and to provide an opportunity to discuss problems with other icemen. Here you benefit from the exchange of ideas and get down to brass tacks on new angles and better methods—talk with men who talk your language about ice. In addition, you can voice your personal opinions where they can be given sound evaluation, and injected into a valuable program from which both you and the industry benefit.

Technical Research: and development for the entire industry, keeping you abreast of all uses for ice uncovered through research or practical application. Too expensive out of your own pocket, this exploratory work is a regular function of NAII which has paid off handsomely for member companies.

Liaison With Government: —day-to-day contact with the Federal agencies and Congress, always alert for any bill, regulation or executive order which can affect the Ice Industry in any manner. This vigilant watch over legislation and bureaus means that every intent and implication concerning ice is examined, reported and, where necessary, countered on the spot. Additionally, upon request, NAII makes available a legal advisory service.

Up-to-Date Facts: on the ice business through the collection and publication of statistical information on production, sales, and so forth—through a stimulating, informative news letter full of ideas and developments. Both help you plan more intelligently. This alone is easily worth the small cost of membership in NAII.

A Competent Full-Time Staff in Washington, D. C. understands the ice industry and knows the iceman's problems. NAII daily takes effective action in behalf of interests of members, bringing to bear on their problems the collective and cooperative effort of all its members and an experienced staff to accomplish far more than can be done alone.

The folder also points out that membership in the Association represents more than 80 percent of the entire ice industry, encompassing all types of manufacturers and sales outlets for ice, and representing more than 1600 ice organizations.

The 1954 Spring Pack of Frozen Spinach

THE spring pack of frozen spinach this year was 43,198,061 pounds, according to a survey by the National Association of Frozen Food Packers. This 1954 total is about 35 percent smaller than the spring pack of 1953, and well below any spring pack of Frozen Spinach since 1950. All major producing regions showed sharp pack reductions from last year, it was reported.

The pattern of container-size usage was significantly different from last year, since the bulk of the pack reduction occurred in retail sizes. The retail pack in the spring of 1953 was almost 52 million pounds; this year, the total for retail sizes was less than 31 million pounds. The pack in small institutional sizes declined more moderately.

And there was a continuation of the trend towards smaller container sizes for the retail pack of Frozen Spinach. The 14 oz. size in 1952 represented the bulk of the retail pack, and in 1953 this size still accounted for an important part of the retail total. But this year the pack in the 14 oz. size was small, representing less than 10% of the total retail pack. In 1954, the 10 oz., 11 oz. and 12 oz. sizes accounted for most of the retail pack.

Canadian Warehousemen Issue Year Book

THE 1954 Year Book of the Canadian Warehousemens Association has been issued, which reports in full detail the discussions and papers at the annual meeting of the Association, held at Montebello, Quebec, May 17-20. Executive secretary of the Association is H. C. Rhodes, 10 Adelaide St. East Toronto.

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Dissolve evenly. Keep brine at constant Salometer strength.
Eliminate labor, guesswork, measuring, waste.
Uniform! Clean! Reduce icing of coils. Prevent clogged nozzles.
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For Refrigeration with UNIT COOLERS or SPRAY DECKS

More Refrigerated Trucks For Frozen Foods

INCREASING public demand for effectively refrigerated foods and industry's need of maximum output are "steadily widening the markets" for equipment that meets both demands, says a financial writer in the New York World Telegram.

Emphasizing that more and more shippers and distributors are utilizing such refrigeration units in short and long-haul trucks, J. R. Tranter, president-general manager of Tranter Manufacturing, Inc. said:

"Inevitably, the growing frozen food industry is proving a major market for mobile refrigeration. Its needs probably won't be satisfied until 1960."

Vital to economical operation of refrigerated trucks, he said, are units that "take up little room in the truck body, leaving maximum space for the pay load." His firm's "Hold-Over" plates, he noted, have been made "an integral part of the refrigeration system itself," permitting the transporting of perishables for up to 24 hours before the trucks "again need help from the plant's own refrigeration system."

Refrigeration en route is assured through "natural convection," requiring only the velocity of air created by opening and closing truck doors at delivery points. Users' of such equipment, he said, now include Borden Co., Swift & Co., Armour & Co., Cudahy Bros. Co., Freuhauf Trailer Co., Crosley Corp., the Norge division of Borg-Warner Corp., National Products Corp. and Horn & Hardart.

Cost-minded managements, he noted, also are stressing ways to curb "downtime," the period when machines are inactive for repairs, replacement or modification. Metal working plants, he said, have found that plate coils—embossed sheets of 16-gauge metal, spot welded to form compact, light units—are more effective than pipe coil. Installed "in a fraction of the time" needed to put in pipe coil, he said, "they take up about half the space and increase tanks' productive capacity."

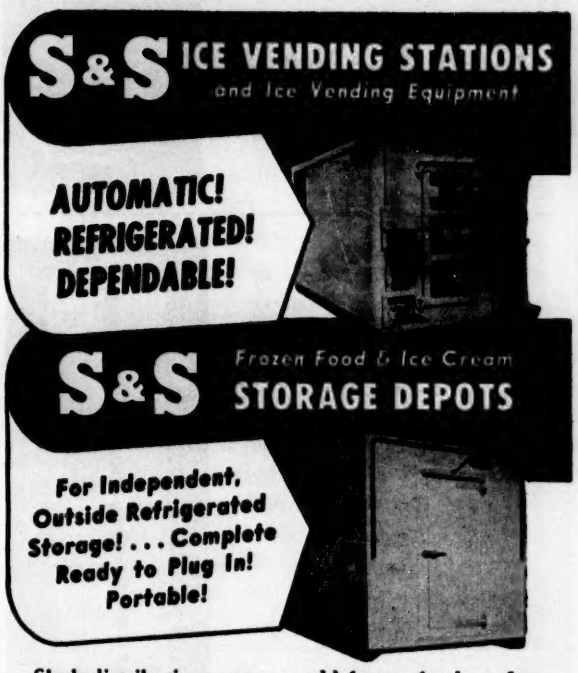
Air Conditioning And Refrigeration Exposition

THE official name of the trade show formerly known as the All-Industry Refrigeration and Air Conditioning Exposition has been changed, it was announced by George E. Mills, show director of the Air-Conditioning and Refrigeration Institute of Washington, D. C., following the summer meeting of the Board of Directors of ARI at the Seaview Country Club, Absecon, New Jersey, on August 9-10.

The next trade show sponsored by ARI will be known as the 9th Exposition of the Air-Conditioning and Refrigeration Industry and is scheduled for Atlantic City on November 28 through December 1, 1955.

Report on Frozen Milk

A VERY significant research report has appeared in the July, 1954 issue of the Journal of Dairy Science, dealing with the stabilization of frozen concentrated milk. L. Tumerman, H. Fram, and K. W. Cornely of National Dairy Research Laboratories Inc. in Oakdale, Long Island, report that enzymatic hydrolysis (by lactase) of lactose (milk sugar) in concentrated milk markedly stabilizes the frozen product because the coagulation of casein during storage seems to be a direct result of the crystallization of the lactose in the milk. If crystallization is prevented, "curding" of the milk on reconstitution is controlled.—T R R F Bulletin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REFRIGERATED!
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STORAGE DEPOTS
For Independent, Outside Refrigerated Storage! . . . Complete Ready to Plug In! Portable!

Slash distribution costs . . . add frozen food profits for chain stores and super-markets!

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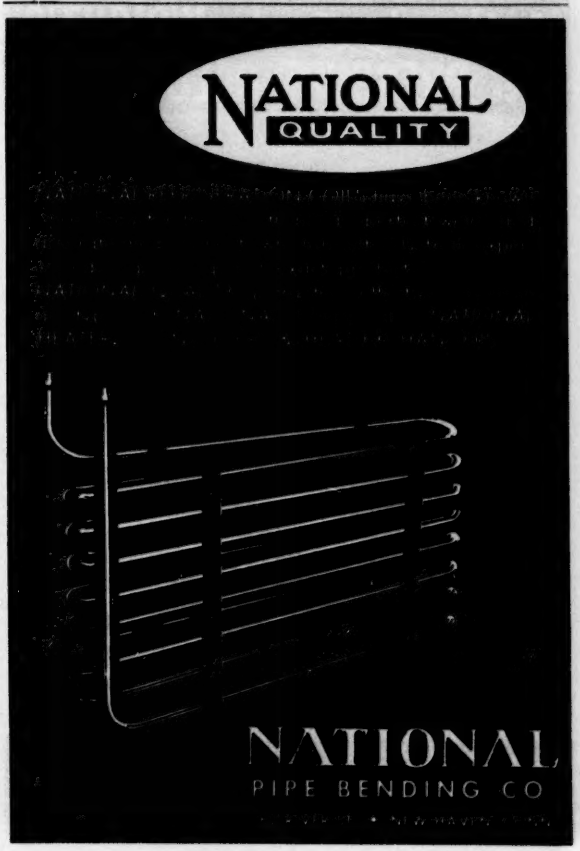

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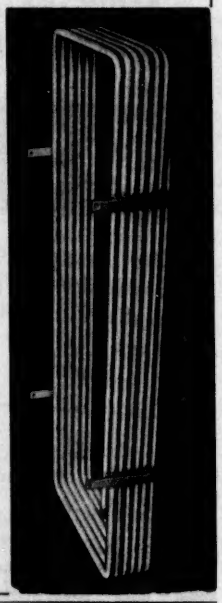
We'll gladly quote on your next job.



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A Handy Tool - WRIGHT'S HEAD-BACK PRESSURE CALCULATOR

Actual Size 3½ in. square

The Head-Back Pressure Calculator quickly determines the proper head pressure, for various refrigerants when the suction pressure, room temperature or mean water temperature is known.

Such variable conditions as the suction pressure, room temperature, water inlet and outlet temperature, kind of gas used, etc., all enter in determining the proper head pressure.

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NICKERSON & COLLINS COMPANY
433 N. Waller Ave. CHICAGO 44, ILL.

Residential Air Conditioning Opens Chicago ASRE Year

CHICAGO Section, ASRE, opened its 1954-55 year September 9 with a double-barrelled program on residential air conditioning. W. J. Hoeing, sales manager, Air Conditioning Division, Servel, Inc., discussed the development, design and application of residential refrigerating units utilizing sources of heat such as gas. The cycle of operation, its performance and operating characteristics were included in the discussion. Mr. Hoeing augmented his talk with colored slide illustrations showing 2, 3 and 5 ton heat activated refrigeration cooling units, and a 25 ton water chiller of similar design.

The engineering service committee which met prior to the regular dinner meeting, was led in a discussion period on the subject of residential air conditioning by David A. Forberg, Engineering Vice-President, Air Comfort Corporation. The discussion centered around the application of continuously operated units for home comfort cooling.

An interesting side light of the discussion were the remarks that refrigeration appliance and service firms were allowing heating and ventilating contractors to take over this market. One party to the discussion asserted that the sale of home air conditioning units involved unusual hours, comparable to those of the family insurance broker or the real estate agent.

Radiation to Control Trichinosis

EFFORTS to adapt radiation to the treatment of pork to kill trichina larvae are under way at the Fission Products Laboratory, University of Michigan. The studies have reached consideration of an installation to the packer level that would accomplish the purpose. The subject was debated at length at the second national conference on Trichinosis in Chicago recently. Estimated cost of treating pork carcasses is very low (a mill or so per pound). Fission products would be used to supply the radiation. A pilot plant would supply more accurate data. Freezing, as a method applied to all pork would be effective, but would require facilities and costs that would exert a seriously adverse economic effect on the industry. On the other hand, whereas 15,000 roentgens of radiation would sterilize the trichina larvae, 30,000 would boost refrigerated shelf life 30 percent, and 60,000 would increase it 100 percent.

In our general effort to predict the effect that radiation may have on refrigeration, this tentative discussion seems to lend credence to the view that radiation may aid refrigerated storage. Here, as in most research, science is laying the basis for what may be possible within a number of years, five or ten, rather than one or two.—T R R F Bulletin.

Western Frozen Food Meet

THE second annual western regional frozen food convention will be held October 3-5 at the Palace Hotel, San Francisco, sponsored by the Frozen Food Distributors Association of California. Attending will be representatives of all divisions of the frozen food industry; packers, refrigerated warehousemen, brokers, distributors, transportation men and suppliers, according to Harold G. Hacke, president of the group.

Emphasis will be on constructive sales policies and practices. Panel sessions will be held on selling by price or advertising, and others on fruits and vegetables, poultry, fish, frozen juices, and specialties.

Special Events Planned For Power Show

A SERIES of special events is being planned in conjunction with the 21st National Exposition of Power and Mechanical Engineering at Philadelphia, December 2 to 7. On the program will be papers and discussions of interest to visiting engineers including those attending the annual meeting in New York of the American Society of Mechanical Engineers, under whose auspices the exposition in Philadelphia's Commercial Museum will be held.

Of particular interest to A.S.M.E. members will be plans now being developed for an inspection trip from the annual meeting in New York to the Power Show via the Fairless Works of U. S. Steel Corp. on Friday, December 3. On Monday, December 6, there will be a joint meeting of the Philadelphia Chapters of the American Society of Mechanical Engineers and the American Society of Civil Engineers at Convention Hall.

Another timely event will be an all-day symposium on Automation to be held by the Instrument Society of America, December 3, covering such topics as "Trends," "New Problems Created by Automation," "Automatic Intelligence Gathering Systems," and an analysis of "The Engineering Control Loop." Another event already announced is a dinner meeting of the Plant Engineers Club of Greater Philadelphia, to be held at the show Thursday, December 2. Some 250 manufacturers will have exhibits in the exposition.

COMING CONVENTIONS

NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS
November 2-4, 1954
Roosevelt Hotel, New Orleans, La.
J. RICHARD KELAHAN, Secretary

CANADIAN ASSOCIATION OF ICE INDUSTRIES
November 2-3, 1954
Sheraton-Brock Hotel, Niagara Falls, Ontario
MRS. MILDRED CROFT, Exec-Secy.

NATIONAL ASSOCIATION ICE INDUSTRIES
November 9-12, 1954
Netherlands-Plaza Hotel, Cincinnati, Ohio
GUY W. JACOBS, Executive Secretary

FLORIDA ICE ASSOCIATION
November 21-23, 1954
Miami, Florida
MURIEL WASHBURN, Secretary

NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING
December 2-7, 1954
Commercial Museum & Convention Hall, Phila, Pa.
E. K. STEVENS, Manager

DELTA STATES ICE ASSOCIATION
December 5-7, 1954
Buena Vista Hotel, Biloxi, Miss.
R. N. MILLING, Secretary

HEATING AND VENTILATING EXPOSITION
January 24-28, 1955
Commercial Museum & Convention Hall, Phila, Pa.
E. K. STEVENS, Manager

AMERICAN WAREHOUSEMEN'S ASSOCIATION
April 12-16, 1955
Edgewater Beach Hotel, Chicago, Ill.
WM. K. DALTON, General Secretary

Polar Processed ICE VENDOR

- SELLS CUBED AND CRUSHED ICE
- OPENS NEW OUTLETS — INCREASES ICE SALES
- NOW AVAILABLE IN DOUBLE AND SINGLE MODELS
- SHIPPED ASSEMBLED AND WIRED — READY TO OPERATE

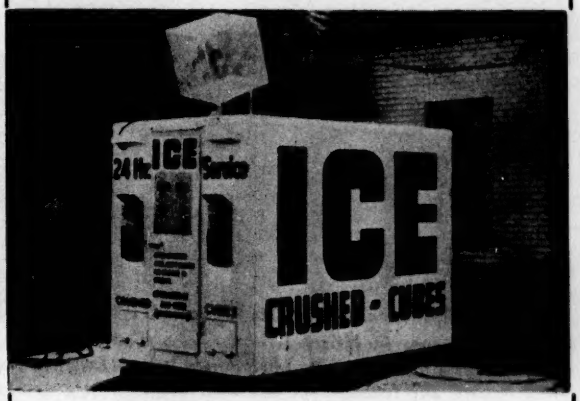


Photo: Model C-2 (Double Unit) POLAR Processed Ice Vendor. This unit sells handy packages of both cubed and crushed ice.

Conveyor Capacity (each belt) 40 10# bags
Storage Capacity 350 10# bags

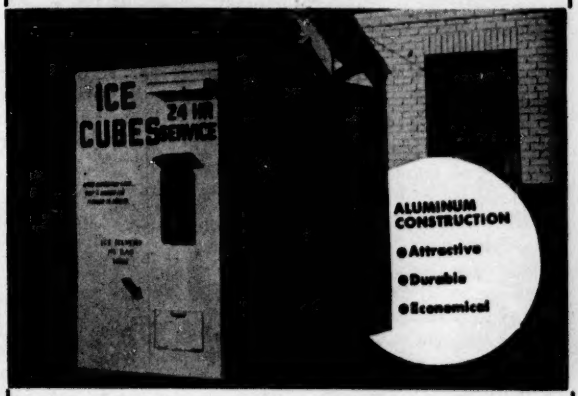


Photo: Model C-1 (Single Unit) POLAR Processed Ice Vendor. This unit sells one product.

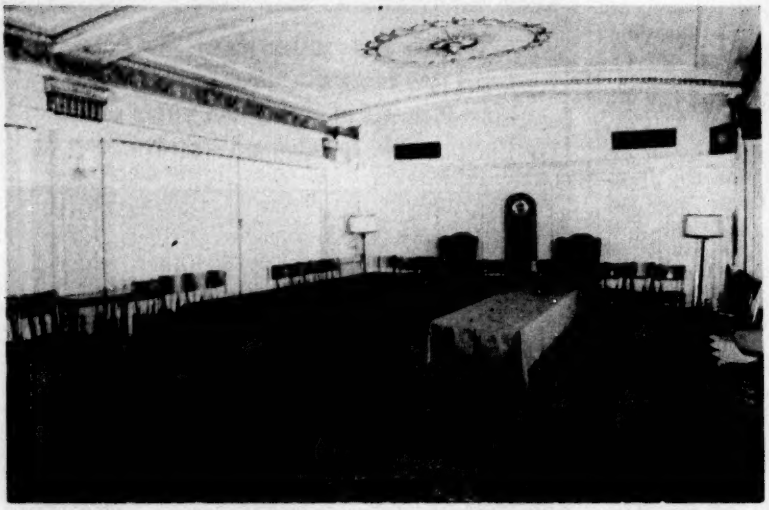
Belt Capacity 40 10# bags
Storage Capacity 200 10# bags

The year 'round demand for processed ice is increasing! You can make cubed and crushed ice available in all convenient locations in your city with POLAR Processed Ice Vendors. The investment is surprisingly low!

Write or Wire Today for descriptive literature and prices. See you at the N.A.I.I. Convention, November 9-12.

REFRIGERATION ENGINEERING CO.
MONTGOMERY, MINNESOTA

Air Cooled Condenser Meets Problem of Mounting Water Cost



View of lounge in Hotel Hildebrecht, Trenton, N.J., showing intake and outlet grilles (at end of room) and folding doors which close off the lounge from its adjacent Wedgewood Room.

MOUNTING water bills, the prospect of a new increase in city water rates and restriction of water usage were the principal factors used in the selection of air conditioning equipment by the Hotel Hildebrecht, Trenton, N. J. for its newly redecorated lounge.

Robert K. McPherson, managing director of the hotel, told representatives of the Ever Ready Refrigeration Co. of Trenton, "I'm a great advocate of comfort in the summer and look toward the day when the Hildebrecht is completely air conditioned. But how can I do it with my already staggering water bill?"

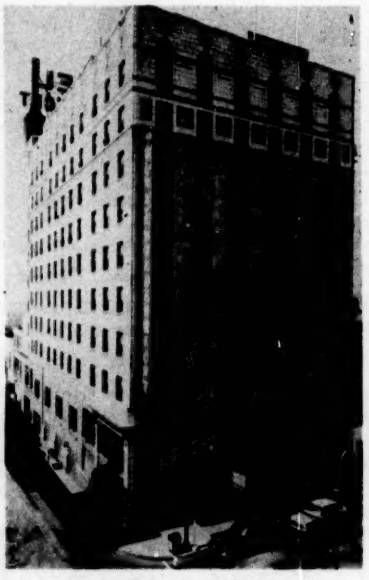
Consequently, when the hotel contracted to install a 15-ton system, the firm recommended the use of Unicon, remote-type air-cooled condenser made by the Kramer Trenton Company, which requires no water supply or plumbing.

Lounge is Partitioned

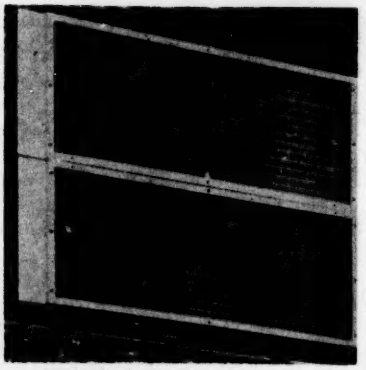
The hotel, in laying plans for redecorating the lounge, decided to close off one side with folding doors. As a consequence, the full lounge can be use as a large banquet room or it can be used to accommodate two small, separate gatherings. The dual nature of the room required the installation of two separate air-conditioning units.

A Kramer BD-2000 Unicon was specified for use with the two 7½ hp York 751 package air conditioners which cool the lounge and its adjacent Wedgewood Room. The BD-2000 is constructed so that it can be used as a one or two circuit condenser. In this instance, each compressor is connected to one circuit of the BD-2000 Unicon.

The Unicon is located on the roof two stories above the compressors. The refrigerant is piped through the kitchen to the condenser, a distance of 60 feet from the cooling units.



Front view of Hotel Hildebrecht.



Air conditioning unit mounted on roof of Hotel Hildebrecht.

The regular crew, using a rope tackle, raised the Unicon into position on the roof.

Mr. McPherson reports that not only has the air-cooled condenser performed efficiently, but that the belt-driven unit was so quiet not a single hotel resident has registered any complaint about noise from its giant fan.

Southern Regional Meeting

ONE of the few occasions for chapter meetings occurred in New Orleans Tuesday and Wednesday, September 28 and 29 at the Jung Hotel. This was a joint meeting of the Southwestern and Southeastern Chapters of the National Association of Refrigerated Warehouses. The Chapter Chairmen, S. A. Kadane of Dallas, Southwestern and Gilbert J. Stecker, Louisville, Southeastern, acted as co-chairmen of the meeting.

The first session was a dinner meeting, starting at 6:00 p.m. on the 28th immediately after the adjournment of the Fall N A R W Executive Committee Meeting. N A R W President, M. W. Young and members of the Executive Committee were present at the Chapter sessions. Following the regional meeting, September 30-October 2, the joint Southern and Southwestern Regional Frozen Food Association convention was held.—NARW Cold Facts.

Fire Destroys Ice Plant

FIRE of unknown origin destroyed the Toppenish Ice and Cold Storage plant at Toppenish, Wash. The loss was estimated by William Hodges, manager, at about $40,000. There was no insurance and the company does not expect to rebuild, according to Mr. Hodges. An adjacent warehouse, built last year was not damaged.

New Bread Freezing Plant

(Continued from page 14)

oil used in the underfloor pipe grid of the packing room — thermostatic valve control; and, a steam coil for concentrator — solenoid valve control.

Building architect was C. Ernest Dakin, Port Chester; consulting engineer, V. C. Patterson & Associates. York, Pa.; mechanical engineer, Hauxwell & Smith, Port Chester; refrigeration equipment and controls, by Carrier Corporation, Syracuse; and Low temperature rooms by Freezer Box Division, Annapolis Yacht Yard, Inc., Annapolis, Md.

Railroads Increase Traffic

(Continued from page 32)

is about 125,000, of which 82,000 cars belong to rail-owned lines like P.F.E. and F.G.E. which rent reefers to railroads. Another 24,300 are owned by private shippers and private car leasing companies like General American Transportation Corporation and North American Corporation, and 18,400 are owned by a few roads operating their own cars. Santa Fe is the biggest of these.

Storage For Frozen Foods

(Continued from page 23)

and unloaded with the utmost dispatch. Frozen products must not be exposed to atmospheric temperatures any more than absolutely necessary. They must be moved directly to or from the carrier's vehicle. Covering the car door with a canvas curtain while loading refrigerated cars or trucks is another excellent procedure to maintain the best temperature conditions while loading. Also, it is imperative to check the car temperature before loading to be certain that it has been properly precooled, and examine the car carefully for any obvious defects that may cause trouble in transit.

Butter Sold to Venezuela

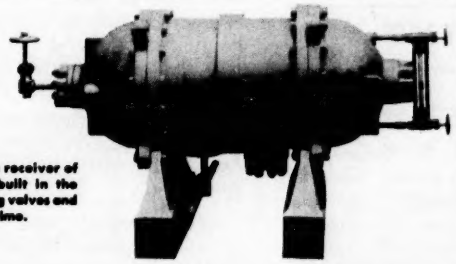
THE U. S. Department of Agriculture has announced the sale of 22,878 pounds of Grade B butter at 39 cents per pound, f.a.s. the port of New York, to the BNS International Sales Corporation, New York, for commercial export to Venezuela. Including this sale, 685,680 pounds of Commodity Credit Corporation-owned butter have been exported.

Frost Heaving of Floors

THE article in the July INDUSTRIAL REFRIGERATION by James A. Callender supplies basic reasons for the project now under way with T R R F aid at the University of Minnesota on frost heaving. Mr. Callender, consulting engineer in Seattle, reports many observations from extensive experience. Insulation, heating, and ventilation requirements under freezer floor vary with soil characteristics and moisture present, and when we know the exact relationship of one to the other, we can make savings in construction and feel assured of protection.

Much excellent information on new structures is being published. For example the March, 1954 INDUSTRIAL REFRIGERATION has a comprehensive description of Produce Terminal's new building in Chicago. The July Food Processing describes Merchant Terminal Corporation's new Kreeson Street plant in Baltimore. These plants use floors containing pipes that circulate fuel oil to raise temperature in case it lowers to a danger point.

Prof. R. C. Jordan at Minnesota is now preparing a questionnaire with which the Foundation will enlist the cooperation of warehousemen in this research.



Frick ammonia receiver of cast iron, as built in the 1880's, showing valves and fittings of that time.

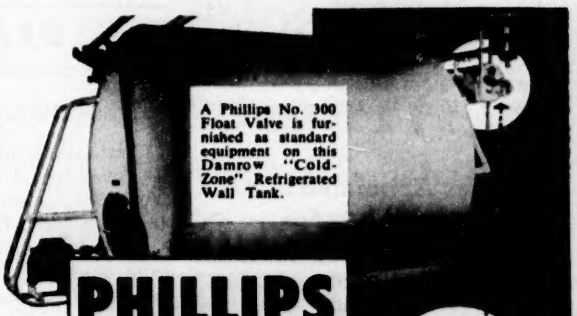
Over 70 Years' Experience

Are Behind FRICK

Valves and Fittings

When you specify Frick Valves and Fittings for your pipe lines, you are sure of permanent satisfaction. Castings of special steel, developed expressly for this service; high-angle tight-closing seats; sizes from ¼" to 14". Good for any refrigerant, and for many other high-pressure gasses and liquids. Frick Catalog O available on request.

FRICK COMPANY
Waynesboro, Penna.



A Phillips No. 300 Float Valve is furnished as standard equipment on this Damrow "Cold-Zone" Refrigerated Wall Tank.

PHILLIPS
FLOAT CONTROLS

STANDARD with the FINEST in REFRIGERATION

With refrigeration manufacturers whose products are famed for quality and dependability, Phillips Controls are standard equipment. On new or older equipment, Phillips Controls bring greater efficiency, more dependable performance. Capacities range from 1 to 1,000 tons for Freon, from 1 to 2,000 tons for ammonia. Full information and engineering advice gladly given.

SERIES 300 PHILLIPS FLOAT CONTROLS

- **SERVICEABLE** — No "pump-down" needed to inspect or renew cartridge.
- **ADAPTABLE**—For most types of flooded evaporators.
- **COMPACT**—Mounts directly on surge drum.
- **IDEAL** for storage tanks, air and water coolers, ice builders and other "packaged" units.

WRITE FOR CATALOG

For Dependable Operation on New Equipment or for Replacement, Specify Phillips.

H. A. PHILLIPS & CO. Designers and Engineers
Refrigeration Controls Systems
3255 W. Carroll Avenue • Chicago 24, Illinois
REPRESENTATIVES: The C & S Equipment Co.
2103 S. San Pedro Street, Los Angeles, California
Mason Emanuels Co. • 1000 Fourth Avenue South, Seattle 4, Wash.

News of People

HAROLD C. EMERSON has been appointed vice-president in charge of sales for Seabrook Farms Company, Bridgeton, N.J. The appointment is part of a program undertaken by the firm to expand retail sales of quick frozen foods under the Seabrook brand, according to C. F. Seabrook, chairman of the board. Mr. Emerson joined Seabrook in 1939 and was previously responsible for liaison between the sales department and warehouse operations.

DR. WAYNE E. KUHN has been named general manager of the newly-created Research and Technical Department of The Texas Company. Announcement was made by Augustus C. Long, Texaco president. Dr. Kuhn had been manager of the Company's Technical and Research Division since September, 1938. He received a B.A. in science from Reed College in 1925 and a Ph. D. in chemistry from Cornell University in 1929, the year he joined The Texas Company.

HORACE W. WILSON, former president of the National Association of Refrigerated Warehouses, and president of the Quaker City Cold Storage Company, Philadelphia, Pa., has accepted appointment on the Pennsylvania State Chamber of Commerce Uniform Commercial Code Committee.

Hotchkiss Appointed Editor ASHVE Journal

THE appointment of Charles H. B. Hotchkiss of Ridgewood, N. J. as editor of the Journal of The American Society of Heating and Ventilating Engineers has been announced by A.V. Hutchinson, executive secretary at Society headquarters, 62 Worth Street, New York.

Mr. Hotchkiss will also edit the "ASHVE Transactions" and other technical bulletins. He brings to this position a wealth of practical experience in both engineering and publishing, and has been active in Society affairs since 1927 and has served on many technical committees.

From 1930 to 1940, Mr. Hotchkiss served as editor of Heating & Ventilating after having been an assistant professor at Pennsylvania State College from where he received his B. S. and M. E. degrees. He left Pennsylvania State College to teach heating and ventilating at Purdue University from 1925 to 1930.

MARSHALL G. MUNCE, vice president of the York Corporation, has been elected to fill the unexpired 3-year term of J. R. Hertzler on the Board of Directors of the Air-Conditioning and Refrigeration Institute, it has been announced by Geo. S. Jones, Jr., managing director of ARI. Munce will represent the Year-Round Residential Air-Conditioning Section of ARI on the Board, and is also Chairman of the By-Laws Committee.

W. A. MOORE, former secretary and general manager of the New Orleans Cold Storage and Warehouse Company is now semi-retired, serving in an advisory capacity. H. L. Brooks has been appointed to assume Mr. Moore's former duties.

CHARLES E. ELLS, vice-president of the Manhattan Refrigerating Company, New York City had a fall recently on a warehouse platform and fractured his hip. He was taken to Valley Hospital, Ridgewood, N. J.

ROBERT B. RICH, has been promoted from superintendent to manager of the United States Security Warehouse, Columbus, Ga.

DEATHS

J. M. Barnes, Sr.

THE death of J. M. Barnes, Sr. occurred at his winter home in Vero Beach, Fla. August 6, after a lengthy illness. He was a resident of Quincy, Fla. and owned and operated, with his brother T. O. Barnes, ice plants in Quincy, Chattahoocchee, and Havana, Fla.

Mr. Barnes was an active member of the Florida Ice Association and the Gulf Coast Ice Association. He was vice-president of the Citizens Bank & Trust Company of Quincy, a Mason, a Shriner, and member of the Presbyterian church.

Jay C. Hormel

THE death of Jay C. Hormel, head of the George A. Hormel meat packing company at Austin, Minn. occurred August 30, following a long illness. He was 61. Mr. Hormel, son of the founder of the company, had suffered for more than a year from a heart condition. He became president in 1928 and chairman of the board in 1946, following the death of his father who established the company in 1891.

J. Vincent Jamison, Jr.

THE death of J. Vincent Jamison, Jr., board chairman of the Jamison Cold Storage Door Co. Hagerstown, Md., occurred Saturday August 28, after a long illness. He was 69. Mr. Jamison also was vice-president of the Herald-Mail Company which publishes Hagerstown's two daily newspapers and a member of The Board of Trustees of St. John's College at Annapolis. He is survived by two sons, John Vincent, 3rd of Hagerstown and Richard of Baltimore.

Victor E. Cedargreen

THE death of Victor E. Cedargreen, head of the Cedergreen Frozen Pack Corporation and of the Columbia Ice & Cold Storage Company, Wenatchee, Wash., resulted August 7 from a stroke.

Mr. Cedargreen came to Wenatchee in 1914 with two brothers to organize and establish the Columbia Ice & Cold Storage Company. In 1937 he, with three of his brothers, organized the Cedargreen Frozen Pack Corporation, which soon became a dominant factor in the frozen food industry.

GERHARDT J. PATITZ, the engineer who designed and supervised the construction of many buildings for Standard Brands Inc., in this country, South America and Cuba, died August 9 at the Peekskill (N.Y.) hospital. He was 77. Mr. Patitz was a member of the American Society of Refrigerating Engineers and the American Society of Mechanical Engineers.

ALLEN AMBROSE SHEAR SR. retired ice manufacturer, Beaumont, Texas, died recently. He was 85. A resident of Beaumont since 1923, Mr. Shear had been active in the Knights of Pythias and Elks lodges and the downtown Kiwanis Club.

PETER J. BERGHAMMER, refrigeration engineer for the Wisconsin Hotel, Milwaukee, until illness forced his retirement four years ago, died recently. He was 59.

ARTHUR E. ROEBKE, 57, manager of the St. Louis office of the Frick Co., died of a heart attack June 26.

JAMES W. RILEY, president of the Riley-Wand Cold Storage Company and the Olean-Kansas Oil Company, Olean, N. Y. died July 23. He retired from business in 1948.

WILLIAM A. BLACK, 72, retired superintendent of the City Ice and Storage Co., Ballard, Wash. died June 15 at his home in Edmonds.

MANUFACTURERS' NEWS

Gifford-Wood Appoints New Western District Manager

THE appointment of Henry J. Gagen as western district manager has been announced by The Gifford-Wood Co., Hudson, N.Y., manufacturers of materials handling equipment. His headquarters will be at 565 West Washington Street in Chicago, Ill. Mr. Gagen assumes his new duties after six years in New York where he served Gifford-Wood as a sales engineer. Before joining the company in 1948, he spent eleven years with the Bendix Products division of the Bendix Aviation Corporation where he was a sales engineer during his last eight years and service engineer for the first three. Prior to Bendix, he was employed by the Indiana State Highway Commission as an industrial engineer for four years.

Henry J. Gagen

Creamery Package Booth At Dairy Industries Show

THE Creamery Package Manufacturing Company announces one of the largest exhibits in the Dairy Industries Exposition when the show opens October 25 at Atlantic City. The CP booth, No. 412 will occupy approximately 6,000 square feet of floor space in the lower level of the exposition. The booth will feature color, sound and cutaway displays to show the outstanding features of CP processing and refrigerating equipment. Ample seating and viewing space will be available. The company will be represented at the Exposition by representatives from all of their 22 branch offices.

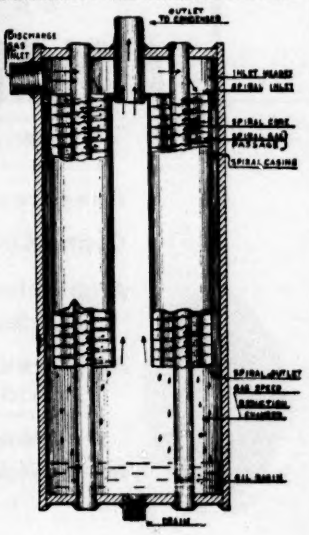
Mojonnier Appointment

THE appointment of Robert W. Mojonnier as new district sales manager of the Chicago zone office is announced by Mojonnier Bros. Co. of Chicago. He has been serving in a like capacity in the company's Los Angeles zone office. Bob has been with Mojonnier Bros. Co. since 1931, with the exception of four years in the Army during World War II, and a year and a half in plant construction work. He has become familiar with the operation of food processing plants in many sections of the country, and his technical information and engineering background will well serve the refrigerating industry in the Chicago area.

Robert W. Mojonnier

"King Zeero"

OIL SEPARATOR



STOPS OIL FROM ENTERING CONDENSER RECEIVER AND LOW SIDE

Allows operation as was originally intended. Simple in operation — no parts to wear out — no screens, metal wool or any close screens to clog, raise discharge pressures and cut down capacity.

When used in connection with air compressors, water is also separated with the oil.

Made in 12 sizes, ½" to 6".

Built for years of trouble free service. Mechanical details on request.

THE KING ZEERO COMPANY
4300-14 W. Montrose Ave., Chicago 41, Ill.

SPECIALISTS IN
Automatic
ICE HANDLING AND VENDING EQUIPMENT

WEIGHER & BAGGER — Controlled uniformity . . . portable or permanent . . . handles up to 6 tons per hour.

Best and most economical method known to close bags . . . fully automatic. BAG SEWING MACHINE

PERFECTION and S & S — VENDING EQUIPMENT 24 Hour Service with ice block or package vendors for every requirement.

Write for Complete details.

BALLARD SALES COMPANY

COMPLETE SUPPLIERS TO THE ICE INDUSTRY

York Opens Chicago Sales Office

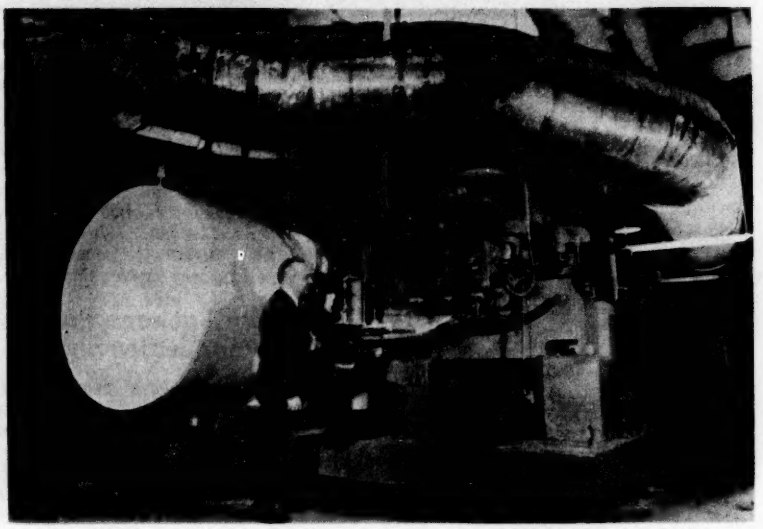
A CENTRAL district and sales engineering office was opened in Chicago by York Corporation October 1, 1954, with John J. Floreth as district manager. The surrounding six state area included in York's Central District will be served by branch offices located in Detroit, Indianapolis, Peoria, Milwaukee and Minneapolis.

The construction and service phases of the operation will continue to be handled by Westerlin and Campbell Company, a wholly-owned subsidiary, which has represented York in the industrial and commercial field in this area since 1906. Mr. Floreth also serves as President, Westerlin and Campbell Company, succeeding Fred T. Brandt, who retired September 30.

York Corp Exhibit At Dairy Industries Exposition

A COMPLETELY new hermetic refrigeration system for trucks will be featured by York Corporation at the Dairy Industries Exposition, Municipal Auditorium, Atlantic City, October 25-30. Power for this revolutionary over-the-road system is furnished by the truck engine. When the truck is garaged, the unit can be plugged into any AC outlet. Also exhibited will be two plate heat exchangers, a rotary booster compressor, Hi-Fin coils, automatic ice-makers, and a giant film transparency of a continuous ice cream hardening tunnel in which the ice cream is hardened in a completely automatic operation. The York exhibit will be located on the lower level in Booth number 405.

Large Compressor Installed For Cooling Water



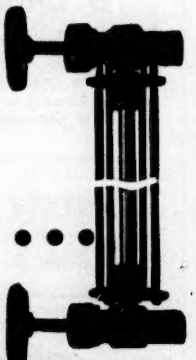
Worthington Corporation centrifugal refrigeration machine installed by the Standard Engineering Co. on the top floor of the 13-story office building owned by John McSchain, Inc. at 1001 Connecticut Avenue, Washington, D.C. Machine is capable of producing 500 tons of refrigeration when cooling 1200 gallons per minute of water from 54 to 44 F. Compressor is driven through step-up gear by a 500 hp wound rotor motor.

SHANK

AMMONIA VALVES AND REFRIGERATION PRODUCTS

SEMI-STEEL SHUT-OFF VALVE

Highest grade non-porous metal—full size ports—clean cut threads. Back seated stem — Shank design base—perfect alignment. Long life packing ring.



ALL-STEEL GAUGE SETS

All-Steel Construction. Automatic shut-off of liquid in case of glass breakage. Composition packing rings give long life, no-leak seal.

If your jobber doesn't stock—write

See your jobber—or write us for prices.

CYRUS SHANK CO.

4650 W. 12th Place, Chicago 50, Ill.

BOWER

B B BRAND

AMMONIA

Anhydrous Ammonia

Cupric Chloride

Ammonium Bicarbonate

Anhydrous Calcium Chloride, purified

Please keep empty cylinders rotating.

Est. 1858

HENRY BOWER CHEMICAL MANUFACTURING COMPANY

29TH AND GRAY'S FERRY ROAD

PHILADELPHIA 46, PA.

Frick Appointment

ANNOUNCEMENT is made by Frick Company, Waynesboro, Pa., of the appointment of Hugo Reichenbach as manager of its branch office in St. Louis. Mr. Reichenbach (Rickey) was graduated in Mechanical Engineering from Washington University in 1931. After taking the Frick Refrigeration Training Course, he served in the Engineering and Estimating Departments of the company before doing sales work at the Dallas Branch. He entered the Army in June of 1942, being discharged as Captain on January 1, 1946, when he returned to the Dallas Branch. For the past five years he has been on the Engineering Staff of the H. K. Ferguson Company, of Cleveland, with broad duties. He has traveled widely both in this country and in Europe.

CATALOGS AND BULLETINS

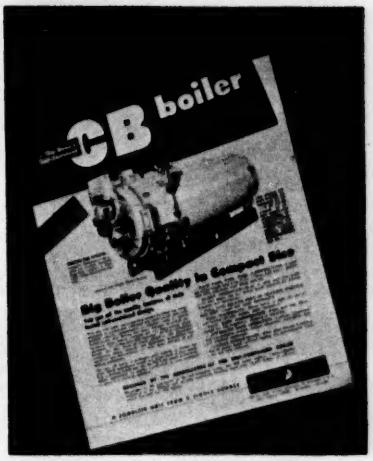
Catalog on Cooling Towers

A NEW catalog on Acme Flow-Cold Cooling Towers, recently published by Acme Industries, Inc., Jackson, Michigan answers the question, "How do cooling towers save you money?" Gist of the answer is that cooling towers cool the water ordinarily discharged from refrigeration and air conditioning systems and allow it to be used over and over again — with over 95 percent less water consumption and important savings in water costs made possible. Where sewage rates are high, additional savings are gained.

Five models of Acme cooling towers are illustrated and described in the new catalog, with capacities ranging from 3 through 15 tons. Advantages of their heavy-duty, all-metal galvanized construction are detailed and complete dimensions are given. A selection procedure is given to enable the user to pick the model of tower best suited to his purposes.

Bulletin on Small Boilers

A NEW bulletin, AD-135, describing the recently announced CB50-80 line of small boilers has been issued by the Cleaver-Brooks Company of Milwaukee, Wisconsin. The Bulletin describes these new CB boilers which are available in 50 to 80 hp (15 to 150 lb steam, 30 lb hot water) for heating and processing. It contains complete information of these major advantages: silent operation, fuel flexibility, fast, easy maintenance, automatic safe operation.



Also illustrated and explained are the new hinged front and rear doors, forced draft system, full five square feet of heating surface per boiler horsepower, four pass construction assures a minimum guaranteed efficiency of 80 percent when operating with oil, and eye level control panel. It also includes drawings and specifications on the CB50-60-70-80 HP models.

Classified Advertising

All classified advertisements are payable in advance. Except for Positions and Help Wanted classifications, this section is reserved exclusively for USED equipment.

RATES: 20c per word; minimum 25 words. $2.00 per line for bold face headings: $15.00 per inch for line listings.

POSITIONS AND HELP WANTED

POSITION WANTED — as refrigeration technician with large institution. Ten years experience covering commercial and industrial equipment including skating arena. Am 38 years old; can furnish references. Write Box OT-8, c/o Industrial Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

WANTED — Experienced and qualified sales engineer. Industrial refrigerating and air conditioning. For engineering and contracting firm representing nationally known manufacturers equipment. Pacific Northwest. $5-12,000 depending sales ability. Give complete details, education, training, references and availability. Write Box OT-3, c/o Industrial Refrigeration.

USED EQUIPMENT—wanted & for sale

FOR SALE — 3x3 self-contained, 4x4, 5x5, 8x8 Yorks. 5x5 Frick. 10" x 7" Worthington booster. 15 ton shell & tube condenser. Write E. Niebling, 1546 St. Clair Ave., Mt. Healthy, Cincinnati 31, Ohio.

FOR SALE—USED ICE PLANTS & REFRIGERATING EQUIPMENT

Complete Ice Plants 20 to 100 Tons
Ammonia Compressors, 3" x 3" to 12½" x 14½"
Condensers, Cranes, Blowers, Scoring Machines, Ice Cans—Various sizes.
Write or wire us on any equipment you may need.

ENTERPRISE EQUIPMENT CORPORATION
77-79 Alexander Street, Yonkers, New York
Cable Add.: ENEQCO Ph.: Yonkers 8-8118-9

FOR SALE—York, Frick and Vilter high speed, York slow speed, 6x6 with motors, 10½x10½, cranes, can fillers, condensers, brine coolers, can agitators, blowers, ice plants, Diesels. Parke Pettegrew, 370 West Broad St., Columbus 8, Ohio.

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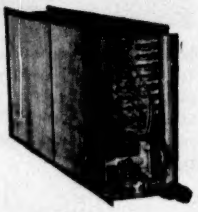

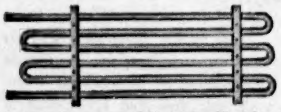

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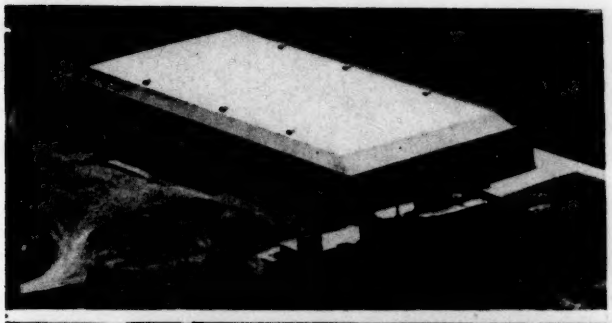

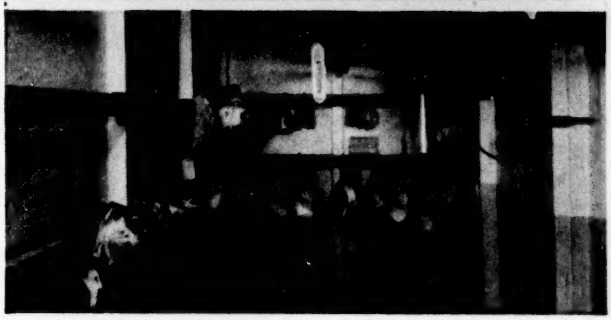

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Fiberglas AE Board	Walls, partitions, ceilings, asphalt adhered	12" x 36"	6 lb./cu. ft. 9 lb./cu. ft.	1, 1½, 2, 3, 4 2
Fiberglas AE-F Board	Floors only	12" x 36"	6 lb./cu. ft.	2, 3, 4
Fiberglas Roof Insulation	Roofs above low temperature spaces	24" x 48"	11½ lb./cu. ft.	½, ¾, 1 1¼, 1½, 2
Fiberglas Dual Temp Pipe Ins.	Low temperature pipe lines	Coverage for ½" to 30" dia. pipes in 3' lengths	9 lb./cu. ft.	1, 1½, 2, 3, 4

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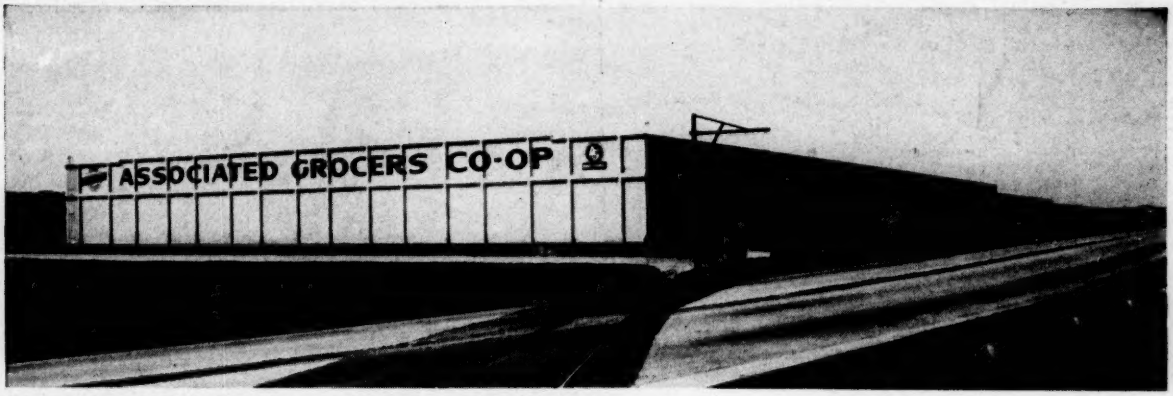
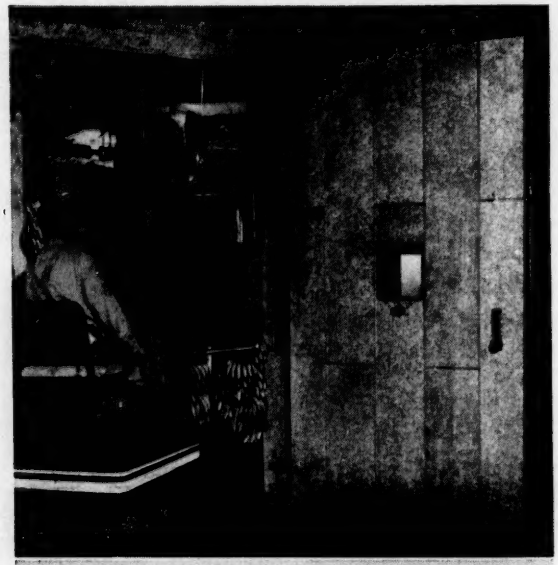


Containing 330,000 sq. ft. of storage space, this warehouse of the Associated Grocers Co-Op in Seattle is the largest of its kind in the Pacific Northwest.



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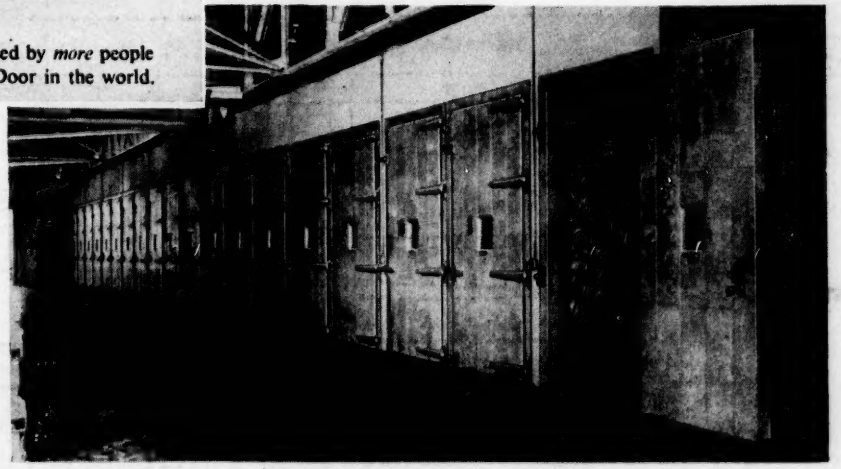

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